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***FUTURE IS UNIQUE***

**AVAX**  **KYOCERA**

**Multilayer Ceramic Leaded Capacitors**





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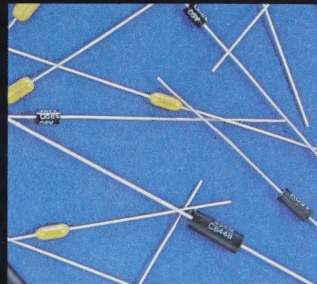
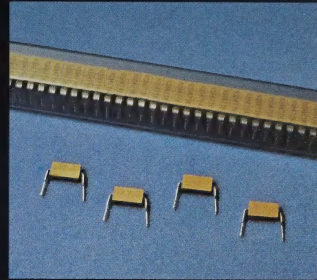
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# The Capacitor

## GENERAL INFORMATION

A capacitor is a component which is capable of storing electrical energy. It consists of two conductive plates (electrodes) separated by insulating material which is called the dielectric. A typical formula for determining capacitance is:

$$C = \frac{.224 KA}{t}$$

C = capacitance (picofarads)

K = dielectric constant (Vacuum = 1)

A = area in square inches

t = separation between the plates in inches (thickness of dielectric)

.224 = conversion constant (.0884 for metric system in cm)

**Capacitance** — The standard unit of capacitance is the farad. A capacitor has a capacitance of 1 farad when 1 coulomb charges it to 1 volt. One farad is a very large unit and most capacitors have values in the micro ( $10^{-6}$ ), nano ( $10^{-9}$ ) or pico ( $10^{-12}$ ) farad level.

**Dielectric Constant** — In the formula for capacitance given above the dielectric constant of a vacuum is arbitrarily chosen as the number 1. Dielectric constants of other materials are then compared to the dielectric constant of a vacuum.

**Dielectric Thickness** — Capacitance is indirectly proportional to the separation between electrodes. Lower voltage requirements mean thinner dielectrics and greater capacitance per volume.

**Area** — Capacitance is directly proportional to the area of the electrodes. Since the other variables in the equation are usually set by the performance desired, area is the easiest parameter to modify to obtain a specific capacitance within a material group.

**Energy Stored** — The energy which can be stored in a capacitor is given by the formula:

$$E = \frac{1}{2} CV^2$$

E = energy in joules (watts-sec)

V = applied voltage

C = capacitance in farads

**Potential Change** — A capacitor is a reactive component which reacts against a change in potential across it. This is shown by the equation for the linear charge of a capacitor:

$$I_{\text{ideal}} = C \frac{dV}{dt}$$

where

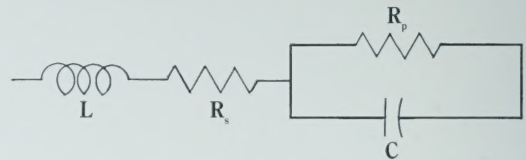
I = Current

C = Capacitance

dV/dt = Slope of voltage transition across capacitor

Thus an infinite current would be required to instantly change the potential across a capacitor. The amount of current a capacitor can "sink" is determined by the above equation.

**Equivalent Circuit** — A capacitor, as a practical device, exhibits not only capacitance but also resistance and inductance. A simplified schematic for the equivalent circuit is:



C = Capacitance

Rs = Series Resistance

L = Inductance

Rs = Parallel Resistance

**Reactance** — Since the insulation resistance ( $R_p$ ) is normally very high, the total impedance of a capacitor is:

$$Z = \sqrt{R_s^2 + (X_c - X_L)^2}$$

where

Z = total impedance

Rs = Series Resistance

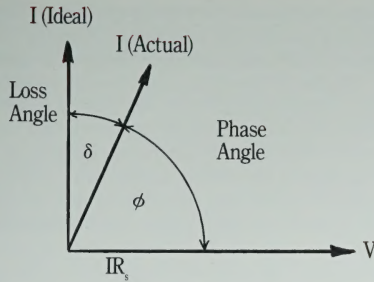
$X_c$  = Capacitive Reactance =  $\frac{1}{2\pi fC}$

$X_L$  = Inductive Reactance =  $2\pi fL$

The variation of a capacitor's impedance with frequency determines its effectiveness in many applications.

**Phase Angle** — Power Factor and Dissipation Factor are often confused since they are both measures of the loss in a capacitor under AC application and are often almost identical in value. In a "perfect" capacitor the current in the capacitor will lead the voltage by  $90^\circ$ .





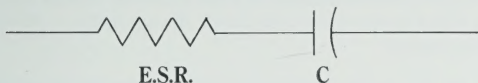
In practice the current leads the voltage by some other phase angle due to the series resistance  $R_s$ . The complement of this angle is called the loss angle and:

$$\text{Power Factor (P.F.)} = \cos \phi \text{ or Sine } \delta$$

$$\text{Dissipation Factor (D.F.)} = \tan \delta$$

for small values of  $\delta$  the tan and sine are essentially equal which has led to the common interchangeability of the two terms in the industry.

**Equivalent Series Resistance** — The term E.S.R. or Equivalent Series Resistance combines all losses both series and parallel in a capacitor at a given frequency so that the equivalent circuit is reduced to a simple R-C series connection.



### Dissipation Factor

The DF/PF of a capacitor tells what percent of the apparent power input will turn to heat in the capacitor.

$$\text{Dissipation Factor} = \frac{E.S.R.}{X_c} = (2 \pi fC) (E.S.R.)$$

The watts loss are:

$$\text{Watts loss} = (2 \pi fCV^2) (D.F.)$$

Very low values of dissipation factor are expressed as their reciprocal for convenience. These are called the "Q" or Quality factor of capacitors.

**Insulation Resistance** — Insulation Resistance is the resistance measured across the terminals of a capacitor and consists principally of the parallel resistance  $R_i$  shown in the equivalent circuit. As capacitance values and hence the area of dielectric increases, the I.R. decreases and hence the product ( $C \times IR$  or  $RC$ ) is often specified in ohm farads or more commonly megohm microfarads. Leakage current is determined by dividing the rated voltage by  $IR$  (Ohm's Law).

**Dielectric Strength** — Dielectric Strength is an expression of the ability of a material to withstand an electrical stress. Although dielectric strength is ordinarily expressed in volts, it is actually dependent on the thickness of the dielectric and thus is also more generically a function of volts/mil.

**Dielectric Absorption** — A capacitor does not discharge instantaneously upon application of a short circuit, but drains gradually after the capacitance proper has been discharged. It is common practice to measure the dielectric absorption by determining the "reappearing voltage" which appears across a capacitor at some point in time after it has been fully discharged under short circuit conditions.

**Corona** — Corona is the ionization of air or other vapors which causes them to conduct current. It is especially prevalent in high voltage units but can occur with low voltages as well where high voltage gradients occur. The energy discharged degrades the performance of the capacitor and can in time cause catastrophic failures.

## CERAMIC CAPACITORS

Multilayer ceramic capacitors are manufactured by mixing the ceramic powder in an organic binder (slurry) and casting it by one technique or another into thin layers typically ranging from about 3 mils in thickness down to 1 mil or thinner.

Metal electrodes are deposited onto the green ceramic layers which are then stacked to form a laminated structure. The metal electrodes are arranged so that their terminations alternate from one edge of the capacitor to another. Upon sintering at high temperature the part becomes a monolithic block which can provide extremely high capacitance values in small mechanical volumes. Figure 1 shows a pictorial view of a multilayer ceramic capacitor.

Multilayer ceramic capacitors are available in a wide range of characteristics. Electronic Industries Association (EIA) and the military have established categories to help divide the



# The Capacitor

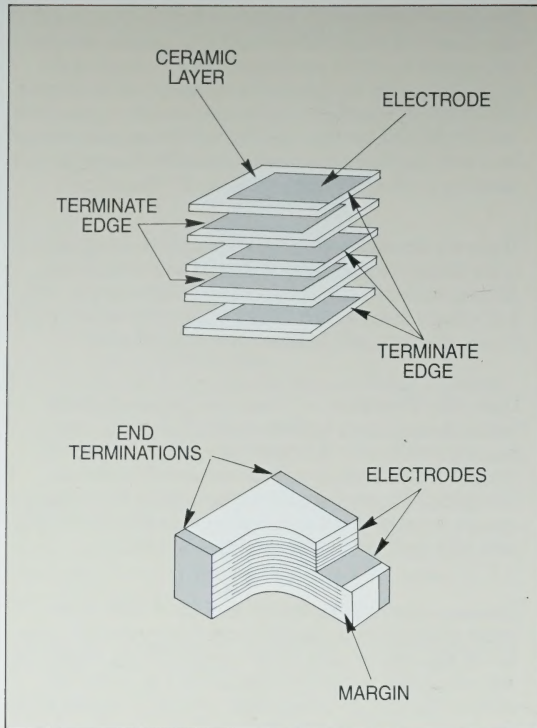


Figure 1

basic characteristics into more easily specified classes. The basic industry specification for ceramic capacitors is EIA specification RS-198 and as noted in the general section it specifies temperature compensating capacitors as Class 1 capacitors. These are specified by the military under specification MIL-C-20. General purpose capacitors with non-linear temperature coefficients are called Class 2 capacitors by EIA and are specified by the military under MIL-C-11015 and MIL-C-39014. The new high reliability military specification, MIL-C-123 covers both Class 1 and Class 2 dielectrics.

**Class 1** — Class 1 capacitors or temperature compensating capacitors are usually made from mixtures of titanates where barium titanate is normally not a major part of the mix. They have predictable temperature coefficients and in general, do not have an aging characteristic. Thus they are the most stable capacitor available. Normally the T.C.s of Class 1 temperature compensating capacitors are NPO (negative-positive 0 ppm/°C). Class 1 extended temperature compensating capacitors are also manufactured in T.C.s from P100 through N2200.

**Class 2** — General purpose ceramic capacitors are called Class 2 capacitors and have become extremely popular because of the high capacitance values available in very small size. Class 2 capacitors are “ferro electric” and vary in capacitance value under the influence of the environmental and electrical operating conditions. Class 2 capacitors are affected by temperature, voltage (both AC and DC), frequency and time. Temperature effects for Class 2 ceramic capacitors are exhibited as non-linear capacitance changes with temperature.

Table 1: EIA Temperature Compensating Ceramic Capacitor Codes

TC TOLERANCES <sup>(1)</sup>										
Capacitance in pF	NPO	N030	N080	N150	N220	N330	N470	N750	N1500	N2200
-55°C to +25°C in PPM/°C										
10 and Over	+30 -75	+30 -80	+30 -90	+30 -105	+30 -120	+60 -180	+60 -210	+120 -340	+250 -670	+500 -1100
+25°C to +85°C in PPM/°C										
10 and Over	±30	±30	±30	±30	±30	±60	±60	±120	±250	±500
Closest MIL-C-20D Equivalent	CG	HG	LG	PG	RG	SH	TH	UJ	NONE	NONE
EIA Desig.	C0G	S1G	U1G	P2G	R2G	S2H	T2H	U2J	P3K	R3L

(1) Table I indicates the tolerance available on specific temperature characteristics. It may be noted that limits are established on the basis of measurements at +25°C and +85°C and that T.C. becomes more negative at low temperature. Wider tolerances are required on low capacitance values because of the effects of stray capacitance.



Table 2: MIL and EIA Temperature Stable and General Application Codes

MIL CODE			EIA CODE	
			Percent Capacity Change Over Temperature Range	
Symbol	Temperature Range		RS198	Temperature Range
A	-55°C to +85°C		X7	-55°C to +125°C
B	-55°C to +125°C		X5	-55°C to +85°C
C	-55°C to +150°C		Y5	-30°C to +85°C
			Z5	+10°C to +85°C
Symbol	Cap. Change Zero Volts	Cap. Change Rated Volts	Code	Per Cent Capacity Change
R	+15%, -15%	+15%, -40%	D	±3.3%
W	+22%, -56%	+22%, -66%	E	±4.7%
X	+15%, -15%	+15%, -25%	F	±7.5%
Y	+30%, -70%	+30%, -80%	P	±10%
Z	+20%, -20%	+20%, -30%	R	±15%
			S	±22%
			T	+22%, -33%
			U	+22%, -56%
			V	+22%, -82%

Temperature characteristic is specified by combining range and change symbols, for example BR or AW. Specification slash sheets indicate the characteristic applicable to a given style of capacitor.

EXAMPLE — A capacitor is desired with the capacitance value at 25°C to increase no more than 7.5% or decrease no more than 7.5% from -30°C to +85°C. EIA Code will be Y5F.

In specifying capacitance change with temperature for Class 2 materials, EIA expresses the capacitance change over an operating temperature range by a 3 symbol code. The first symbol represents the cold temperature end of the temperature range, the second represents the upper limit of the operating temperature range and the third symbol represents the capacitance change allowed over the operating temperature range. Table 2 provides a detailed explanation of the EIA system.

**Effects of Voltage** — Variations in voltage affects only the capacitance and dissipation factor. The application of DC voltage reduces both the capacitance and dissipation factor while the application of an AC voltage within a reasonable range

tends to increase both capacitance and dissipation factor readings. If a high enough AC voltage is applied, eventually it will reduce capacitance just as a DC voltage will. Figure 2 shows the effects of AC voltage.

Capacitor specifications specify the AC voltage at which to measure (normally 0.5 or 1 VAC) and application of the wrong voltage can cause spurious readings. Figure 3 gives the voltage coefficient of dissipation factor for various AC voltages at 1 kilohertz. Applications of different frequencies will affect the percentage changes versus voltages.

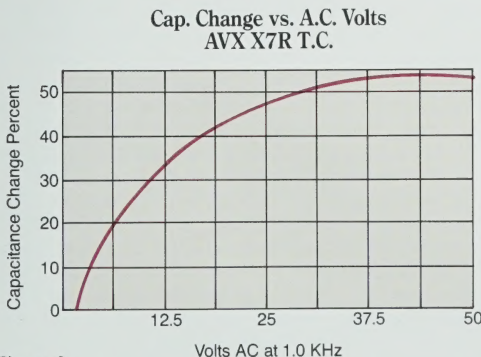


Figure 2

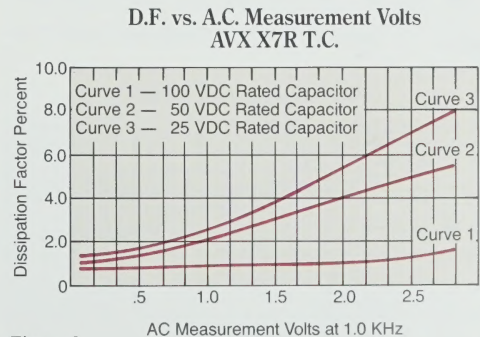


Figure 3



# The Capacitor

The effect of the application of DC voltage is shown in Figure 4. The voltage coefficient is more pronounced for higher K dielectrics. These figures are shown for room temperature conditions. The combination characteristic known as voltage temperature limits which shows the effects of rated voltage over the operating temperature range is shown in Figure 5 for the military BX characteristic.

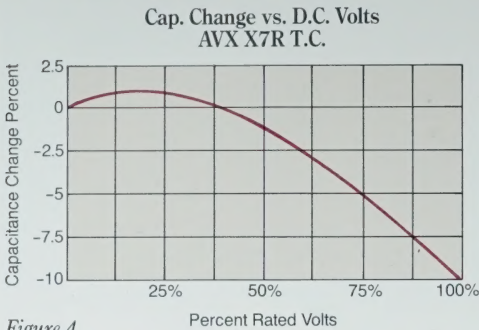


Figure 4

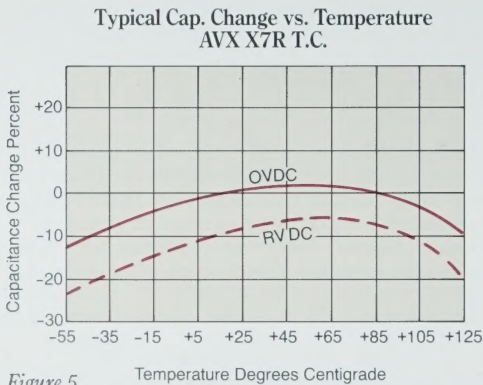


Figure 5

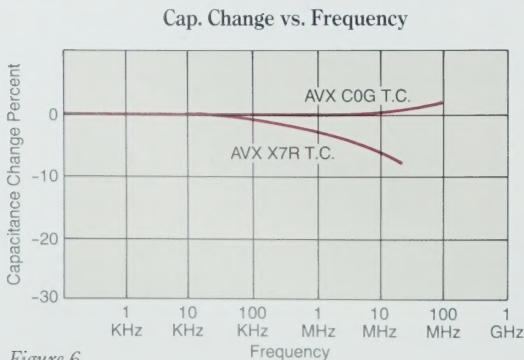


Figure 6

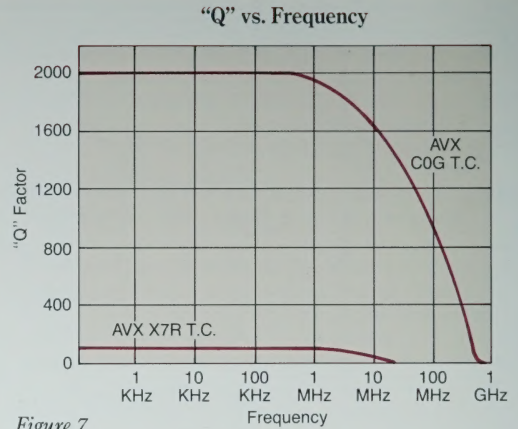


Figure 7

**Effects of Frequency** — Frequency affects capacitance and dissipation factor as shown in Figures 6 and 7.

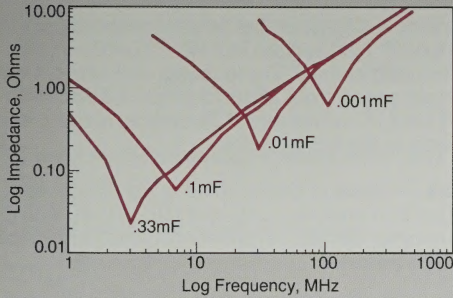
Variation of impedance with frequency is an important consideration for decoupling capacitor applications. Lead length, lead configuration and body size all affect the impedance level over more than ceramic formulation variations. (Figure 8)

**Effects of Time** — Class 2 ceramic capacitors change capacitance and dissipation factor with time as well as temperature, voltage and frequency. This change with time is known as aging. Aging is caused by a gradual re-alignment of the crystalline structure of the ceramic and produces an exponential loss in capacitance and decrease in dissipation factor versus time. A typical curve of aging rate for semistable ceramics is shown in Figure 9 and a table is given showing the aging rates of various dielectrics.

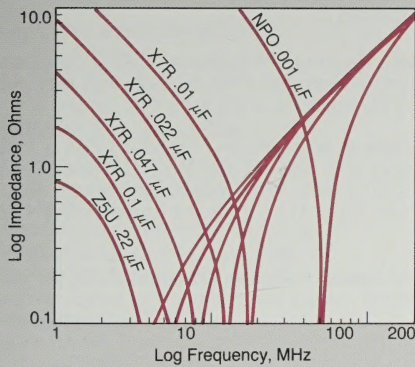
If a ceramic capacitor that has been sitting on the shelf for a period of time, is heated above its curie point, (125°C for 4 hours or 150°C for ½ hour will suffice) the part will de-age and return to its initial capacitance and dissipation factor readings. Because the capacitance changes rapidly, immediately after de-aging, the basic capacitance measurements are normally referred to a time period sometime after the de-aging process. Various manufacturers use different time bases but the most popular one is one day or twenty-four hours after "last heat." Change in the aging curve can be caused by the application of voltage and other stresses. The possible changes in capacitance due to de-aging by heating the unit explain why capacitance changes are allowed after test, such as temperature cycling, moisture resistance, etc., in MIL specs. The application of high voltages such as dielectric withstanding voltages also tends to de-age capacitors and is why re-reading of capacitance after 12 or 24 hours is allowed in military specifications after dielectric strength tests have been performed.



Impedance vs. Frequency  
Effect of Capacitance — AVX SpinGuards



Impedance vs. Frequency  
Effect of Dielectric — AVX DIPGuards



Impedance vs. Frequency  
Effect of Lead Length — Military CKR05 .01mF

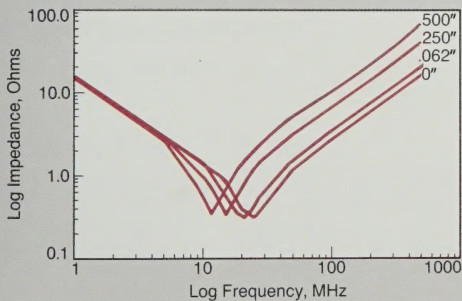
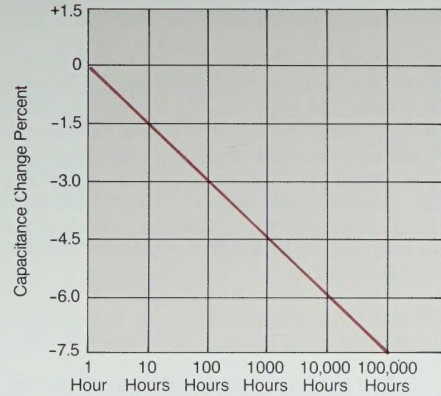


Figure 8

Typical Curve of Aging Rate  
X7R Dielectric



Characteristic	Max. Aging Rate %/Decade
NPO	None
X7R	1.5
Z5U	5

Figure 9

**Effects of Mechanical Stress** — High "K" dielectric ceramic capacitors exhibit some low level piezoelectric reactions under mechanical stress. As a general statement, the piezoelectric output is higher, the higher the dielectric constant of the ceramic. It is desirable to investigate this effect before using high K dielectrics as coupling capacitors in extremely low level applications.

**Reliability** — Historically ceramic capacitors have been one of the most reliable types of capacitors in use today. The approximate formula for the reliability of a ceramic capacitor is:

$$\frac{L_o}{L_t} = \left( \frac{V_t}{V_o} \right)^X \left( \frac{T_t}{T_o} \right)^Y$$

where

$L_o$  = operating life

$L_t$  = test life

$V_t$  = test voltage

$V_o$  = operating voltage

$T_t$  = test temperature and

$T_o$  = operating temperature in °C

X, Y = see text

Historically for ceramic capacitors exponent X has been considered as 3. The exponent Y for temperature effects typically tends to run about 8.

# The Capacitor

## GENERAL ELECTRICAL AND ENVIRONMENTAL SPECIFICATIONS

Many AVX ceramic capacitors are purchased in accordance with Military Specifications, MIL-C-39014 MIL-C-11015, MIL-C-20, MIL-C-55681, and MIL-C-123 or according to individual customer specification. When ordered to these specifications, the parts will meet the requirements set forth in these documents. The General Electrical and Environmental Specifications listed below detail test conditions which are common to the foregoing and to most ceramic capacitor specifications. If additional information is needed, AVX Application Engineers are ready to assist you.

**CAPACITANCE:** Capacitance shall be tested in accordance with Method 305 of MIL-STD-202.

**Class 1** dielectric to 100 pF measured at 1 MHz,  $\pm 100$  KHz,  $> 100$  pF measured at 1 KHz  $\pm 100$  Hz both at  $1.0 \pm 0.2$  VAC.

**Class 2** dielectrics (except High K) to 100 pF shall be measured at 1 MHz  $\pm 100$  KHz,  $> 100$  pF measured at 1 KHz  $\pm 100$  Hz both at  $1.0 \pm 0.2$  VAC.

**High K** dielectrics measured at 1 KHz  $\pm 100$  Hz with less than 0.5 VAC or less applied.

**Dissipation Factor** — D.F. shall be measured at the same frequency and voltage as specified for capacitance.

**Dielectric Strength** — The dielectric strength shall be measured in accordance with Method 301 of MIL-STD-202 with a suitable resistor in series with the power supply to limit the charging current to 50 ma. max.

**Insulation Resistance** — Insulation Resistance shall be measured in accordance with Method 302 of MIL-STD-202 with rated voltage or 200 VDC whichever is less applied. The current shall be limited to 50 ma. max. and the charging time shall be 2.0 minutes maximum.

**Burn-In** — (Where specified.) 100% of the parts shall be subjected to 5 cycles of Thermal Shock per Method 107 Test Condition A of MIL-STD-202 followed by voltage conditioning at twice rated voltage and maximum rated temperature for 100 hours or as specified. After Burn-In, parts shall meet all initial requirements.

**Barometric Pressure** — Capacitors shall be tested in accordance with Method 105 of MIL-STD-202 Test Condition D (100,000 ft.) with 100% rated voltage applied for 5 seconds with current limited to 50 ma. No evidence of flashover or damage is permitted.

**Solderability** — Capacitors shall be tested in accordance with Method 208 of MIL-STD-202 with 95% coverage of new solder.

**Vibration** — Capacitors shall be tested in accordance with Method 208 Test Condition D of MIL-STD-202 with the bodies rigidly clamped. The specimens shall be tested in 3 mutually perpendicular planes for a total of 8 hours with 125% rated DC voltage applied. No evidence of opens, intermittents or shorts is permitted.

**Shock** — Capacitors shall be tested in accordance with Method 213 Condition 1 (100 Gs) of MIL-STD-202 with the bodies rigidly clamped. No evidence of opens, intermittents or shorts is permitted.

**Thermal Shock and Immersion** — Capacitors shall be tested in accordance with Method 107 Condition A of MIL-STD-202 with high test temperature (maximum rated operating temperature) followed by Method 104 of MIL-STD-202 Test Condition B.

**Moisture Resistance** — Capacitors shall be tested in accordance with Method 106 of MIL-STD-202 with rated voltage or 100 VDC whichever is less applied for the first 10 cycles.

**Resistance to Solder Heat** — Capacitors shall be tested in accordance with Method 210 of MIL-STD-202 with immersion to .050 of body. AVX Ceralam capacitors are manufactured with solder which melts at a temperature greater than 450°F.

**General Considerations** — The application of voltage or temperature usually causes temporary changes in the capacitance of Class 2 ceramic capacitors. These changes are normally in the positive direction and may cause out-of-tolerance capacitance readings. If a capacitance reading is made immediately after a dielectric strength or insulation resistance test and parts are high capacitance, they should be re-read after a minimum wait of 12 hours.



## BASIC CAPACITOR FORMULAS

### I. Capacitance (farads)

$$\text{English: } C = \frac{.224 \text{ K A}}{T_D}$$

$$\text{Metric: } C = \frac{.0884 \text{ K A}}{T_D}$$

### II. Energy stored in capacitors (Joules, watt · sec)

$$E = \frac{1}{2} CV^2$$

### III. Linear charge of a capacitor (Amperes)

$$I = C \frac{dV}{dt}$$

### IV. Total Impedance of a capacitor (ohms)

$$Z = \sqrt{R_s^2 + (X_C - X_L)^2}$$

### V. Capacitive Reactance (ohms)

$$X_C = \frac{1}{2 \pi fC}$$

### VI. Inductive Reactance (ohms)

$$X_L = 2 \pi fL$$

### VII. Phase Angles:

Ideal Capacitors: Current leads voltage 90°

Ideal Inductors: Current lags voltage 90°

Ideal Resistors: Current in phase with voltage

### VIII. Dissipation Factor (%)

$$D.F. = \tan \delta \text{ (loss angle)} = \frac{E.S.R.}{X_C} = (2 \pi fC) (E.S.R.)$$

### IX. Power Factor (%)

P.F. = Sine  $\delta$  (loss angle) = Cos  $\phi$  (phase angle)

P.F. = (when less than 10%) = DF

### X. Quality Factor (dimensionless)

$$Q = \cotan \delta \text{ (loss angle)} = \frac{1}{D.F.}$$

### XI. Equivalent Series Resistance (ohms)

$$E.S.R. = (D.F.) (X_C) = (D.F.) / (2 \pi fC)$$

### XII. Power Loss (watts)

$$\text{Power Loss} = (2 \pi fCV^2) (D.F.)$$

### XIII. KVA (Kilowatts)

$$KVA = 2 \pi fCV^2 \times 10^{-3}$$

### XIV. Temperature Characteristic (ppm/°C)

$$T.C. = \frac{C_t - C_{25}}{C_{25} (T_1 - 25)} \times 10^6$$

### XV. Cap Drift (%)

$$C.D. = \frac{C_1 - C_2}{C_1} \times 100$$

### XVI. Reliability of Ceramic Capacitors

$$\frac{L_0}{L_t} = \left( \frac{V_t}{V_o} \right)^X \left( \frac{T_t}{T_o} \right)^Y$$

### XVII. Capacitors in Series (current the same)

$$\text{Any Number: } \frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} \dots \frac{1}{C_N}$$

$$\text{Two: } C_T = \frac{C_1 C_2}{C_1 + C_2}$$

### XVIII. Capacitors in Parallel (voltage the same)

$$C_T = C_1 + C_2 \dots + C_N$$

### XIX. Aging Rate

$$A.R. = \% \Delta C / \text{decade of time}$$

### XX. Decibels

$$db = 20 \log \frac{V_1}{V_2}$$

## METRIC PREFIXES

Pico	X 10 <sup>-12</sup>
Nano	X 10 <sup>-9</sup>
Micro	X 10 <sup>-6</sup>
Milli	X 10 <sup>-3</sup>
Deci	X 10 <sup>-1</sup>
Deca	X 10 <sup>+1</sup>
Kilo	X 10 <sup>+3</sup>
Mega	X 10 <sup>+6</sup>
Giga	X 10 <sup>+9</sup>
Tera	X 10 <sup>+12</sup>

## SYMBOLS

K	= Dielectric Constant	f	= frequency	L <sub>t</sub>	= Test life
A	= Area	L	= Inductance	V <sub>t</sub>	= Test voltage
T <sub>D</sub>	= Dielectric thickness	$\delta$	= Loss angle	V <sub>o</sub>	= Operating voltage
V	= Voltage	$\phi$	= Phase angle	T <sub>t</sub>	= Test temperature
t	= time	X & Y	= exponent effect of voltage and temp.	T <sub>o</sub>	= Operating temperature
R <sub>s</sub>	= Series Resistance	L <sub>o</sub>	= Operating life		

# NPO Dielectric "A"

## GENERAL SPECIFICATIONS

### Capacitance Range

See Individual Parts Specifications

### Capacitance Test at 25°C

Measured at 1 VRMS max. at 1 KHz (1 MHz for 100 pF or less)

### Capacitance Tolerances

C =  $\pm 0.25$  pF, D =  $\pm 0.50$  pF, E =  $\pm 0.5\%$ , F =  $\pm 1.0\%$ , G =  $\pm 2\%$ , H =  $\pm 3\%$ ,

J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

For values less than 10 pF tightest tolerance available is  $\pm 0.25$  pF

### Operating Temperature Range

-55°C to +125°C

### Temperature Characteristic

$0 \pm 30$  ppm/°C

### Voltage Ratings

200, 100 & 50 Vdc

### Dissipation Factor

.15% max. (+25°C and +125°C) for values greater than 30 pF  
or  $Q = 20 \times C + 400$  for values of 30 pF and below.

1.0 VRMS, 1 MHz for values  $\leq 100$  pF, and

1 KHz for values  $> 100$  pF

### Insulation Resistance 25°C (MIL-STD-202-Method 302)

100 K megohms or 1000 megohms -  $\mu$ F minimum,  
whichever is less

### Dielectric Strength

250% of rated Vdc

### Life Test (1,000 hours)

200% rated voltage at +125°C

### Moisture Resistance (MIL-STD-202-Method 106)

### Thermal Shock (MIL-STD-202-Method 107, condition A, at rated elevated temperature)

-55°C to +125°C

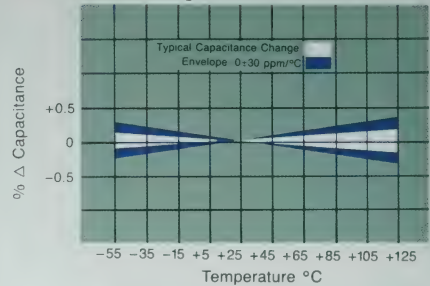
### Immersion Cycling (MIL-STD-202-Method 104, condition B)

For current reliability information, consult factory.

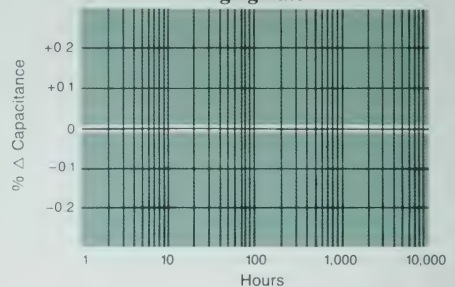


## TYPICAL CHARACTERISTICS

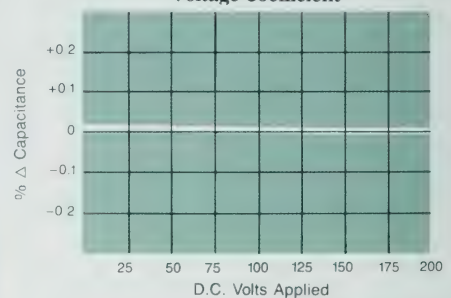
### Temperature Coefficient



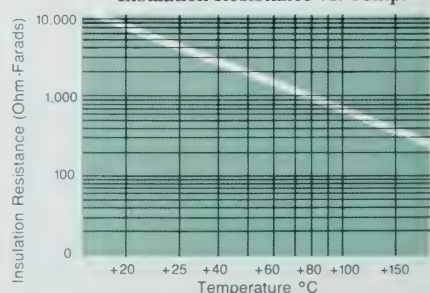
### Aging Rate



### Voltage Coefficient



### Insulation Resistance vs. Temp.





# X7R Dielectric "C"

## GENERAL SPECIFICATIONS

### Capacitance Range

See Individual Parts Specifications

### Capacitance Test at 25°C

Measured at 1 VRMS max. at 1 KHz

### Capacitance Tolerances

J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

### Operating Temperature Range

-55°C to +125°C

### Temperature Characteristic

$\pm 15\%$  (0 Vdc)

### Voltage Ratings

200, 100 & 50 Vdc

### Dissipation Factor

2.5% max. at 1 KHz, 1 VRMS max.

### Insulation Resistance 25°C (MIL-STD-202-Method 302)

100 K megohms or 1000 megohms  $\cdot \mu\text{F}$  minimum, whichever is less

### Dielectric Strength

250% of rated Vdc

### Life Test (1,000 hours)

200% rated voltage at +125°C

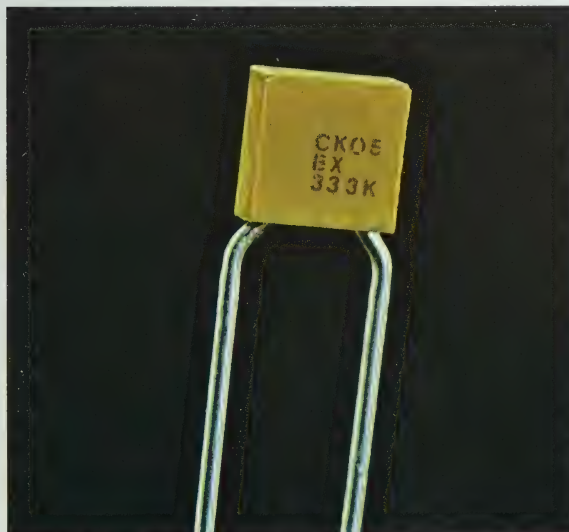
### Moisture Resistance (MIL-STD-202-Method 106)

### Thermal Shock (MIL-STD-202-Method 107, condition A, at rated elevated temperature)

-55°C to +125°C

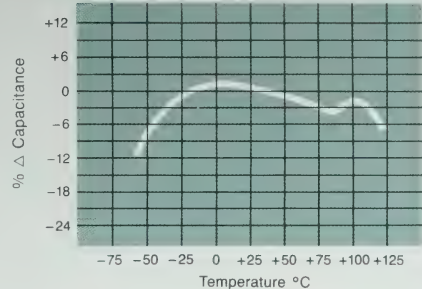
### Immersion Cycling (MIL-STD-202-Method 104, condition B)

For current reliability information, consult factory.

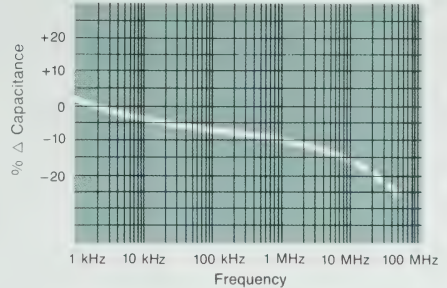


## TYPICAL CHARACTERISTICS

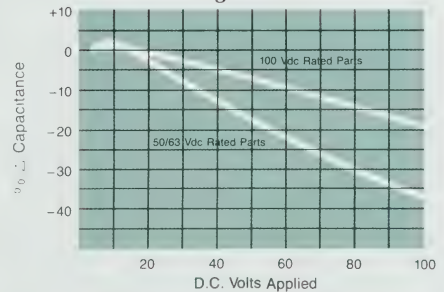
### Temperature Coefficient



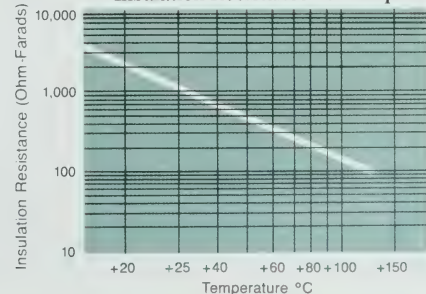
### Δ Capacitance vs. Frequency



### Voltage Coefficient



### Insulation Resistance vs. Temp.



# Z5U Dielectric "E"

## GENERAL SPECIFICATIONS

### Capacitance Range

See Individual Parts Specifications

### Capacitance Test at 25°C

Measured at 0.5 VRMS max. at 1 KHz.

### Capacitance Tolerances

M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$ , P = GMV\*

### Operating Temperature Range

+10°C to +85°C

### Temperature Characteristic

+22%, -56%

### Voltage Ratings

100 & 50 Vdc

### Dissipation Factor

4.0% max. at 1 KHz, .5 VRMS max.

### Insulation Resistance 25°C (MIL-STD-202-Method 302)

10 K megohms or 100 megohms  $\cdot \mu\text{F}$  minimum, whichever is less

### Dielectric Strength

200% of rated Vdc

### Life Test (1,000 hours)

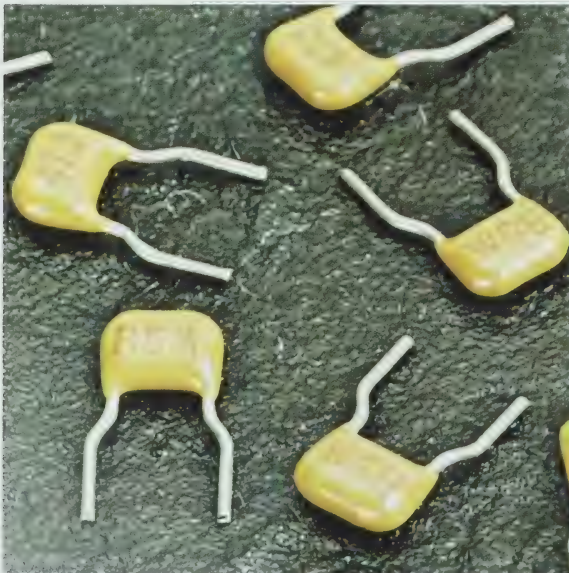
150% rated voltage at +85°C

### Moisture Resistance (MIL-STD-202-Method 106)

### Immersion Cycling (MIL-STD-202-Method 104, condition B)

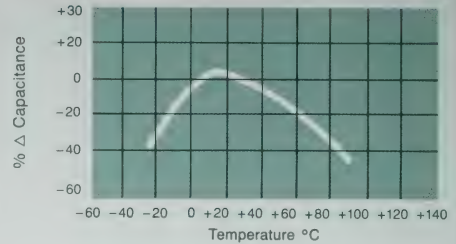
For current reliability information, consult factory.

\*Guaranteed Minimum Value

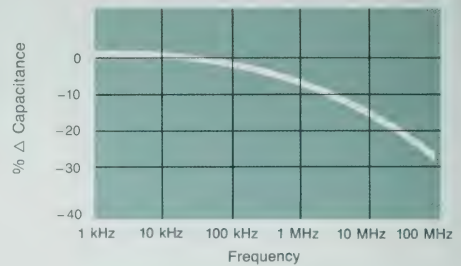


## TYPICAL CHARACTERISTICS

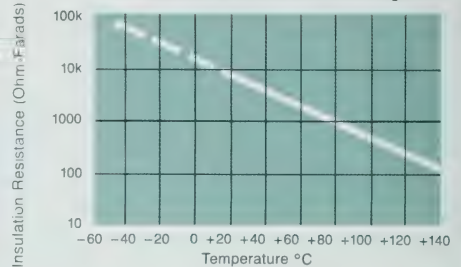
### Temperature Coefficient



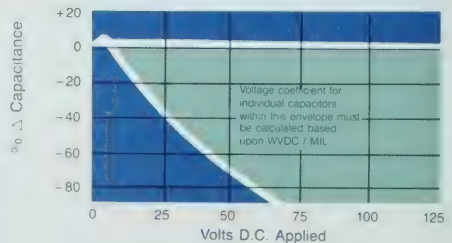
### Δ Capacitance vs. Frequency



### Insulation Resistance vs. Temp.



### Voltage Coefficient





# Special Dielectrics

## Y5V (Dielectric "G")

### GENERAL SPECIFICATIONS

#### Capacitance Range

Contact AVX

#### Capacitance Test at 25°C

Measured at 0.3 VRMS max. at 1 KHz.

#### Capacitance Tolerances

$\pm 20\%$ , [+80, -20]%

#### Operating Temperature Range

-30°C to +85°C

#### Temperature Characteristic

+22%, -82%

#### Voltage Ratings

100 & 50 Vdc

#### Dissipation Factor

4.0% max. at 1 KHz, .3 VRMS max.

#### Insulation Resistance 25°C (MIL-STD-202-Method 302)

10 K megohms or 100 megohms  $\cdot \mu\text{F}$  minimum, whichever is less

#### Dielectric Strength

200% of rated Vdc

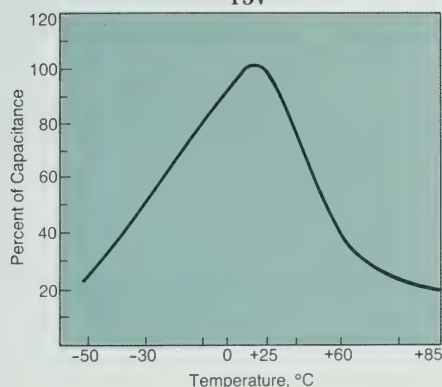
#### Life Test (1,000 hours)

150% rated voltage at +85°C

#### Moisture Resistance (MIL-STD-202-Method 106)

#### Immersion Cycling (MIL-STD-202-Method 104, condition B)

Typical Temperature Characteristic  
Y5V



## Special "T" Formulation

### GENERAL SPECIFICATIONS

#### Capacitance Range

Contact AVX

#### Capacitance Test at 25°C

Measured at 0.3 VRMS max. at 1 KHz.

#### Capacitance Tolerances

$\pm 20\%$ , [+80, -20]%

#### Operating Temperature Range

-30°C to +85°C

#### Temperature Characteristic

See Curve

#### Voltage Ratings

100 & 50 Vdc

#### Dissipation Factor

4.0% max. at 1 KHz, .3 VRMS max.

#### Insulation Resistance 25°C (MIL-STD-202-Method 302)

10 K megohms or 100 megohms  $\cdot \mu\text{F}$  minimum, whichever is less

#### Dielectric Strength

200% of rated Vdc

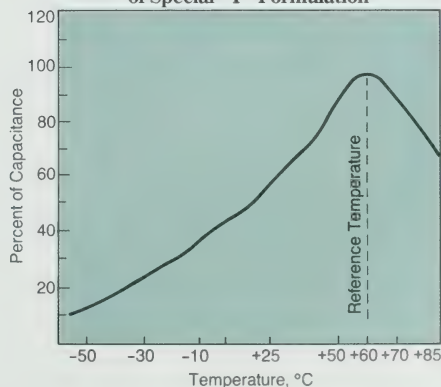
#### Life Test (1,000 hours)

150% rated voltage at +85°C

#### Moisture Resistance (MIL-STD-202-Method 106)

#### Immersion Cycling (MIL-STD-202-Method 104, condition B)

Typical Temperature Characteristic  
of Special "T" Formulation<sup>(1)</sup>



#### <sup>(1)</sup> Temperature Characteristics

The ceramic dielectric constant temperature performance has been optimized by maximizing capacitance at or near the operating temperature. The peak capacitance occurs at 60°C as opposed to 25°C for most high k dielectrics.

# Radial Leads/SkyCap<sup>®</sup>

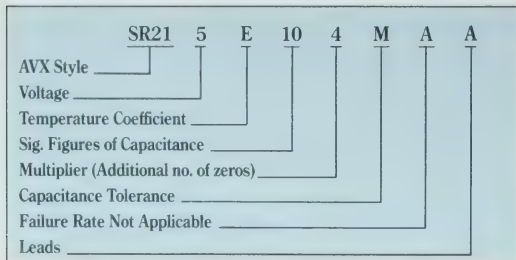
## GENERAL INFORMATION

AVX SR Series  
 Conformally Coated Radial Leaded MLC  
 Temperature Coefficients: NPO, X7R, Z5U  
 200, 100, 50 Volts  
 Case Material: Epoxy  
 Lead Material: Solderable

## HOW TO ORDER

AVX Styles: SR15, SR20, SR21, SR22, SR27, SR30, SR40, SR50

Part Number Example



Part Number Codes

Voltages: 50V = 5, 100V = 1, 200V = 2

Temp. Coefficient: NPO = A, X7R = C, Z5U = E

Sig. Figures of Capacitance and Multiplier: First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104. (For values below 10pF, use "R" in place of decimal point, e.g., 1R4 = 1.4pF).

Capacitance Tolerances:

NPO: C =  $\pm 25\text{pF}$ , D =  $\pm 5\text{pF}$  (<10 pF only), F =  $\pm 1.0\%$  (>50 pF only), G =  $\pm 2.0\%$  (>25 pF only), J =  $\pm 5\%$ , K =  $\pm 10\%$

X7R: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

Z5U: M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$

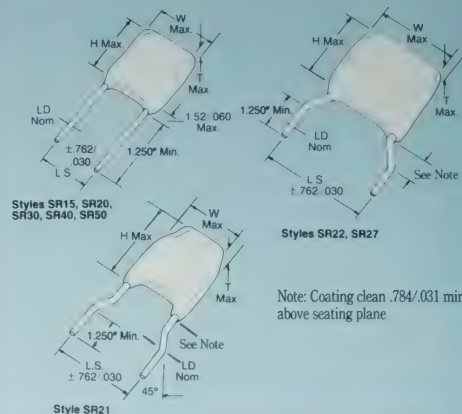
Tolerance Codes F and G are not available in SR15.

Failure Rate: A = Not Applicable

Leads: T = Trimmed Leads, .230"  $\pm$  .030"

A = Long Leads, 1.25" minimum

Dimensions: Millimeters (Inches)



## MARKING

Marking is as size permits in descending order.  
 (For code identification, see How to Order section.)

- Capacitance Code
- Tolerance Code
- A (AVX)
- Voltage Code
- Temperature Coefficient Code
- 3-Digit EIA Date Code/Lot Code

## PACKAGING REQUIREMENTS

	Quantity per Bag
SR15, 20, 21, 22, 27, 30, 40	1000 Pieces
SR50	500 Pieces

Note: SR15, SR20, SR21, SR30, and SR40 available on tape and reel per EIA specifications RS-468. See Pages 24 and 25.



# NPO Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

EIA Characteristic

Dimensions: Inches (Millimeters)

AVX Style		SR15			SR20			SR21			SR22			SR27			SR30			SR40			SR50		
Width (W)		.150 (3.81)			.200 (5.08)			.200 (5.08)			.200 (5.08)			.260 (6.604)			.300 (7.62)			.400 (10.16)			.500 (12.70)		
Height (H)		.150 (3.81)			.200 (5.08)			.200 (5.08)			.200 (5.08)			.250 (6.35)			.300 (7.62)			.400 (10.16)			.500 (12.70)		
Thickness (T)		.100 (2.54)			.125 (3.175)			.125 (3.175)			.125 (3.175)			.160 (4.06)			.150 (3.81)			.150 (3.81)			.200 (5.08)		
Lead Spacing (L.S.)		.100 (2.54)			.100 (2.54)			.200 (5.08)			.250 (6.35)			.300 (7.62)			.200 (5.08)			.200 (5.08)			.400 (10.16)		
Lead Diameter (L.D.)		.020 (.508)			.020 (.508)			.020 (.508)			.020 (.508)			.020 (.508)			.020 (.508)			.020 (.508)			.025 (.635)		
Cap. in.* pF	Industry Preferred Values in Blue	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	200	100	50	200	100	50	200	100	50	200	100	50	100	50	100	50	100	50			
1.0-9.9	SR151A1R0DAA																								
10	SR151A100KAA																								
15	SR...A150KAA																								
22	SR...A220KAA																								
33	SR...A330KAA																								
39	SR...A390KAA																								
47	SR...A470KAA																								
68	SR...A680KAA																								
100	SR151A101KAA																								
150	SR...A151KAA																								
220	SR...A221KAA																								
330	SR...A331KAA																								
390	SR...A391KAA																								
470	SR...A471KAA																								
680	SR...A681KAA																								
1000	SR211A102KAA																								
1500	SR...A152KAA																								
2200	SR...A222KAA																								
3900	SR...A392KAA																								
4700	SR...A472KAA																								
6800	SR...A682KAA																								
8200	SR...A822KAA																								
10,000	SR305A103KAA																								
15,000	SR...A153KAA																								
22,000	SR...A223KAA																								
33,000	SR...A333KAA																								
39,000	SR...A393KAA																								
47,000	SR...A473KAA																								
68,000	SR...A683KAA																								
100,000	SR...A104KAA																								

For other styles, voltages, tolerances and lead lengths see Part No. Codes or contact factory.

\*Other capacitance values available upon special request.

 = Industry preferred values

# Radial Leads/SkyCap®

## X7R Dielectric SIZE AND CAPACITANCE SPECIFICATIONS


EIA Characteristic

Dimensions: Inches (Millimeters)

AVX Style	SR15	SR20	SR21	SR22	SR27	SR30	SR40	SR50
Width (W)	.150 (3.81)	.200 (5.08)	.200 (5.08)	.200 (5.08)	.260 (6.604)	.300 (7.62)	.400 (10.16)	.500 (12.70)
Height (H)	.150 (3.81)	.200 (5.08)	.200 (5.08)	.200 (5.08)	.250 (6.35)	.300 (7.62)	.400 (10.16)	.500 (12.70)
Thickness (T)	.100 (2.54)	.125 (3.175)	.125 (3.175)	.125 (3.175)	.160 (4.06)	.150 (3.81)	.150 (3.81)	.200 (5.08)
Lead Spacing (L.S.)	.100 (2.54)	.100 (2.54)	.200 (5.08)	.250 (6.35)	.300 (7.62)	.200 (5.08)	.200 (5.08)	.400 (10.16)
Lead Diameter (L.D.)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.025 (.635)
Cap. in.* Industry Preferred Values in Blue	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50
470 1000 1500	SR...C471KAA SR155C102KAA SR...C152KAA							
2200 3300 4700	SR...C222KAA SR...C332KAA SR...C472KAA							
6800 10,000 15,000	SR...C682KAA SR215C103KAA SR...C153KAA							
22,000 33,000 47,000	SR...C223KAA SR...C333KAA SR...C473KAA							
68,000 100,000 150,000	SR...C683KAA SR215C104KAA SR...C154KAA							
220,000 330,000 390,000	SR215C224KAA SR...C334KAA SR...C394KAA							
470,000 1.0 µF 2.2 µF	SR305C474KAA SR305C105KAA SR405C225KAA							
2.7 µF 4.7 µF	SR505C275KAA SR505C475KAA							

For other styles, voltages, tolerances and lead lengths see Part No. Codes or contact factory.

\*Other capacitance values available upon special request.

 = Industry preferred values



# Z5U Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

EIA Characteristic

Dimensions: Inches (Millimeters)

AVX Style	SR15	SR20	SR21	SR22	SR27	SR30	SR40	SR50
Width (W)	.150 (3.81)	.200 (5.08)	.200 (5.08)	.200 (5.08)	.260 (6.604)	.300 (7.62)	.400 (10.16)	.500 (12.70)
Height (H)	.150 (3.81)	.200 (5.08)	.200 (5.08)	.200 (5.08)	.250 (6.35)	.300 (7.62)	.400 (10.16)	.500 (12.70)
Thickness (T)	.100 (2.54)	.125 (3.175)	.125 (3.175)	.125 (3.175)	.160 (4.06)	.150 (3.81)	.150 (3.81)	.200 (5.08)
Lead Spacing (L.S.)	.100 (2.54)	.100 (2.54)	.200 (5.08)	.250 (6.35)	.300 (7.62)	.200 (5.08)	.200 (5.08)	.400 (10.16)
Lead Diameter (L.D.)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.025 (.635)
Cap. in.* pF	Industry Preferred Values in Blue	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50	WVDC 100 50
10,000	SR155E103ZAA							
47,000	SR.....E473ZAA							
100,000	SR215E104ZAA							
150,000	SR.....E154ZAA							
220,000	SR215E224ZAA							
330,000	SR215E334ZAA							
470,000	SR215E474ZAA							
680,000	SR.....E684ZAA							
1.0 $\mu$ F	SR305E105ZAA							
1.5 $\mu$ F	SR.....E155ZAA							
2.2 $\mu$ F	SR.....E225ZAA							
3.3 $\mu$ F	SR.....E335ZAA							
4.7 $\mu$ F	SR.....E475ZAA							

For other styles, voltages, tolerances and lead lengths see Part No. Codes or contact factory.

\*Other capacitance values available upon special request.

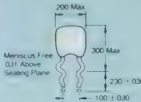
 = Industry preferred values



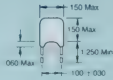
# SkyCap® Configurations by Lead Spacing

## LEAD SPACING .100 ±.030

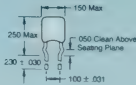
**SR14**  
(T=.125)



**SR15\***  
(T=.100)



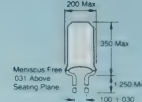
**SR07\***  
(T=.100)



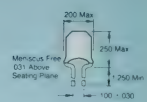
**SR20\***  
(T=.125)



**SR23\***  
(T=.125)



**SR29\***  
(T=.125)



## LEAD SPACING .141 ±.030

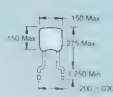
**SR44**  
(T=.125)



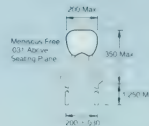
Leads = #22AWG

## LEAD SPACING .200 ±.030

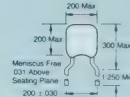
**SR12\***  
(T=.125)



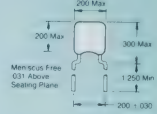
**SR13\***  
(T=.125)



**SR21\***  
(T=.125)

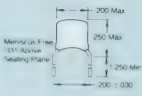


**SR21-85\***  
(T=.125)

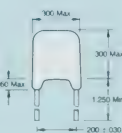


## LEAD SPACING .200 ±.030

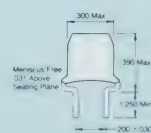
**SR28\***  
(T=.125)



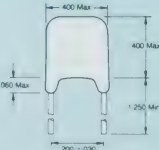
**SR30\***  
(T=.150)



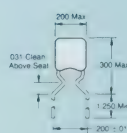
**SR32\***  
(T=.150)



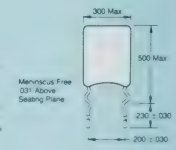
**SR40\***  
(T=.150)



**SR59\***  
(T=.125)



**SR61\***  
(T=.150)



**SR63**  
(T=.150)



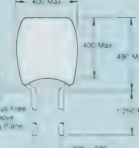
**SR65\***  
(T=.150)



**SR67**  
(T=.125)



**SR75\***  
(T=.150) Leads = #22AWG



### Notes:

1. All leads are #24 AWG unless otherwise noted.
2. Available in tape and reel packaging(\*).
3. Other styles are also available, contact factory.
4. (T = XXX) under type designation is maximum thickness in inches.



LEAD SPACING <b>.234 ±.030</b>		LEAD SPACING <b>.250 ±.030</b>		
<b>SR43</b> (T=.150)	<b>SR46</b> (T=.150)	<b>SR16</b> (T=.125)	<b>SR22</b> (T=.125)	<b>SR33</b> (T=.150)
Leads = #22AWG				

LEAD SPACING <b>.300 ±.030</b>		LEAD SPACING <b>.375 ±.030</b>	
<b>SR27</b> (T=.150)	<b>SR34</b> (T=.150)	<b>SR38</b> (T=.150)	

LEAD SPACING <b>.400 ±.030</b>		LEAD SPACING <b>.438 ±.030</b>		
<b>SR50</b> (T=.200)	<b>SR76</b> (T=.175)	<b>SR42</b> (T=.150)	<b>SR45</b> (T=.125)	<b>SR52</b> (T=.200)
Leads = #22AWG		Leads = #22AWG		

- Notes:**
1. All leads are #24 AWG unless otherwise noted.
  2. Available in tape and reel packaging(\*).
  3. Other styles are also available, contact factory.
  4. (T = XXX) under type designation is maximum thickness in inches.

# Radial Leads/Ceralam®

## GENERAL INFORMATION

AVX MR Series  
 Molded Radial Leaded MLC  
 NPO, X7R, Z5U Temperature Coefficients  
 50, 100, 200 Volts  
 Case Material: Molded Epoxy  
 Lead Material: Solderable

## HOW TO ORDER

AVX Styles: MR04, MR05, MR06, MR07, MR08

### Part Number Example

	MR05	1	A	56	1	J	A	A
AVX Style								
Voltage								
Dielectric								
Sig. Figures of Capacitance								
Multiplier (Additional no. of zeros)								
Capacitance Tolerance <sup>1</sup>								
Failure Rate								
Leads								

### Part Number Codes

Voltages: 50V = 5, 100V = 1, 200V = 2

Dielectric: NPO = A, X7R = C, Z5U = E

**Sig. Figures of Capacitance and Multiplier:** First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 560 pF as 561. (For values below 10pF, use "R" in place of decimal point, e.g., 1R4 = 1.4 pF).

### Capacitance Tolerances:

NPO: D =  $\pm 5$ pF (<10 pF only), F =  $\pm 1.0\%$  (>50 pF only),

G =  $\pm 2.0\%$  (>25 pF only), J =  $\pm 5\%$ , K =  $\pm 10\%$

X7R: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

Z5U: M =  $\pm 20\%$ , Z = +80%, -20%

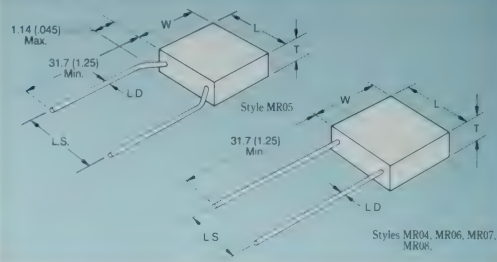
**Failure Rate:** Does not apply

**Leads:** A = Standard Solderable

T<sup>1</sup> = Trimmed leads, .230"  $\pm$  .030"

<sup>1</sup> Trimmed lead length for the MR05 style will be measured from the bend in the lead (seating plane).

Dimensions: Millimeters (Inches)



## MARKING

Marking is as size permits: for code identification see How To Order.

- AVX
- Capacitance and Tolerance
- Voltage Rating
- Temperature Coefficient
- Date Code
- Lot Code

## PACKAGING REQUIREMENTS

**Bulk Packaging:** 1000 pcs. per sealed package except MR07/MR08 (300 pcs.)

**Tape and Reel:** Available on MR04, MR05, and MR06 only.

**Ammo Packaging:** Available on special request.




# NPO SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)



AVX Style		MR04			MR05			MR06			MR07			MR08		
Length		4.82 (.190")			4.82 (.190")			7.36 (.290")			12.44 (.490")			12.44 (.490")		
Width		4.82 (.190")			4.82 (.190")			7.36 (.290")			12.44 (.490")			12.44 (.490")		
Thickness		2.28 (.090")			2.28 (.090")			2.28 (.090")			3.55 (.140")			6.09 (.240")		
Lead Spacing		2.54 (.100")			5.08 (.200")			5.08 (.200")			10.16 (.400")			10.16 (.400")		
Lead Diameter		.635 (.025")			.635 (.025")			.635 (.025")			.635 (.025")			.635 (.025")		
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	200	100	50	200	100	50	200	100	50	200	100	50
1.0 to 9.1	MR...5A1R0DAA MR...5A9R1DAA															
10 12 15	MR...5A100KAA MR...5A120KAA MR...5A150KAA															
18 22 27	MR...5A180KAA MR...5A220KAA MR...5A270KAA															
33 39 47	MR...5A330KAA MR...5A390KAA MR...5A470KAA															
56 68 82	MR...5A560KAA MR...5A680KAA MR...5A820KAA															
100 120 150	MR...5A101KAA MR...5A121KAA MR...5A151KAA															
180 220 270	MR...5A181KAA MR...5A221KAA MR...5A271KAA															
330 390 470	MR...5A331KAA MR...5A391KAA MR...5A471KAA															
560 680 820	MR...5A561KAA MR...5A681KAA MR...5A821KAA															
1000 1200 1500	MR...5A102KAA MR...5A122KAA MR...5A152KAA															
1800 2200 2700	MR...5A182KAA MR...5A222KAA MR...5A272KAA															
3300 3900 4700	MR...5A332KAA MR...5A392KAA MR...5A472KAA															
5600 6800 8200	MR...5A562KAA MR...5A682KAA MR...5A822KAA															
10,000 12,000 15,000	MR...5A103KAA MR...5A123KAA MR...5A153KAA															
18,000 22,000 27,000	MR...5A183KAA MR...5A223KAA MR...5A273KAA															
33,000 39,000 47,000	MR...5A333KAA MR...5A393KAA MR...5A473KAA															
56,000 68,000 82,000	MR...5A563KAA MR...5A683KAA MR...5A823KAA															
100,000 120,000 150,000	MR...5A104KAA MR...5A124KAA MR...5A154KAA															
180,000 220,000	MR...5A184KAA MR...5A224KAA															

For trimmed leads see "How To Order".  
For other tolerances see "How To Order".  
For other voltages see "How To Order".

 = Industry preferred values

\*Length, width and thickness dimensions are  $\pm 0.254$  mm ( $\pm 0.010$ "). Lead diameter is  $\pm 0.05$  mm ( $\pm 0.002$ "). Lead spacing is  $\pm 0.381$  mm ( $\pm 0.015$ ").

# Radial Leads/Ceralam®

## X7R SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)



AVX Style		MR04			MR05			MR06			MR07			MR08		
Length		4.82 (.190")			4.82 (.190")			7.36 (.290")			12.44 (.490")			12.44 (.490")		
Width		4.82 (.190")			4.82 (.190")			7.36 (.290")			12.44 (.490")			12.44 (.490")		
Thickness		2.28 (.090")			2.28 (.090")			2.28 (.090")			3.55 (.140")			6.09 (.240")		
Lead Spacing		2.54 (.100")			5.08 (.200")			5.08 (.200")			10.16 (.400")			10.16 (.400")		
Lead Diameter		.635 (.025")			.635 (.025")			.635 (.025")			.635 (.025")			.635 (.025")		
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	200	100	50	200	100	50	200	100	50	200	100	50
100	MR_5C101KAA															
120	MR_5C121KAA															
150	MR_5C151KAA															
180	MR_5C181KAA															
220	MR_5C221KAA															
270	MR_5C271KAA															
330	MR_5C331KAA															
390	MR_5C391KAA															
470	MR_5C471KAA															
560	MR_5C561KAA															
680	MR_5C681KAA															
820	MR_5C821KAA															
1000	MR_5C102KAA															
1200	MR_5C122KAA															
1500	MR_5C152KAA															
1800	MR_5C182KAA															
2200	MR_5C222KAA															
2700	MR_5C272KAA															
3300	MR_5C332KAA															
3900	MR_5C392KAA															
4700	MR_5C472KAA															
5600	MR_5C562KAA															
6800	MR_5C682KAA															
8200	MR_5C822KAA															
10,000	MR_5C103KAA															
12,000	MR_5C123KAA															
15,000	MR_5C153KAA															
18,000	MR_5C183KAA															
22,000	MR_5C223KAA															
27,000	MR_5C273KAA															
33,000	MR_5C333KAA															
39,000	MR_5C393KAA															
47,000	MR_5C473KAA															
56,000	MR_5C563KAA															
68,000	MR_5C683KAA															
82,000	MR_5C823KAA															
100,000	MR_5C104KAA															
120,000	MR_5C124KAA															
150,000	MR_5C154KAA															
180,000	MR_5C184KAA															
220,000	MR_5C224KAA															
270,000	MR_5C274KAA															
330,000	MR_5C334KAA															
390,000	MR_5C394KAA															
470,000	MR_5C474KAA															
560,000	MR_5C564KAA															
680,000	MR_5C684KAA															
820,000	MR_5C824KAA															
1.0 µF	MR_5C105KAA															
1.2 µF	MR_5C125KAA															
1.5 µF	MR_5C155KAA															
1.8 µF	MR_5C185KAA															
2.0 µF	MR_5C205KAA															
2.2 µF	MR_5C225KAA															
2.7 µF	MR_5C275KAA															
3.3 µF	MR_5C335KAA															
3.9 µF	MR_5C395KAA															
4.7 µF	MR_5C475KAA															
5.6 µF	MR_5C565KAA															



For trimmed leads see "How To Order".  
For other tolerances see "How To Order".  
For other voltages see "How To Order".

= Industry preferred values

Length, width and thickness dimensions are  $\pm 0.254$  mm ( $\pm 0.010$ "). Lead diameter is  $\pm 0.05$  mm ( $\pm 0.002$ "). Lead spacing is  $\pm 0.381$  mm ( $\pm 0.015$ ").






# Z5U Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)



AVX Style		MR04		MR05		MR06		MR07		MR08	
Length		4.82 (.190")		4.82 (.190")		7.36 (.290")		12.44 (.490")		12.44 (.490")	
Width		4.82 (.190")		4.82 (.190")		7.36 (.290")		12.44 (.490")		12.44 (.490")	
Thickness		2.28 (.090")		2.28 (.090")		2.28 (.090")		3.55 (.140")		6.09 (.240")	
Lead Spacing		2.54 (.100")		5.08 (.200")		5.08 (.200")		10.16 (.400")		10.16 (.400")	
Lead Diameter		.635 (.025")		.635 (.025")		.635 (.025")		.635 (.025")		.635 (.025")	
Cap. in pF	Typical AVX Part Nos.	WVDC		WVDC		WVDC		WVDC		WVDC	
		100	50	100	50	100	50	100	50	100	50
10,000	MR_5E103ZAA										
12,000	MR_5E123ZAA										
15,000	MR_5E153ZAA										
18,000	MR_5E183ZAA										
22,000	MR_5E223ZAA										
27,000	MR_5E273ZAA										
33,000	MR_5E333ZAA										
39,000	MR_5E393ZAA										
47,000	MR_5E473ZAA										
56,000	MR_5E563ZAA										
68,000	MR_5E683ZAA										
82,000	MR_5E823ZAA										
100,000	MR_5E104ZAA										
120,000	MR_5E124ZAA										
150,000	MR_5E154ZAA										
180,000	MR_5E184ZAA										
220,000	MR_5E224ZAA										
270,000	MR_5E274ZAA										
330,000	MR_5E334ZAA										
390,000	MR_5E394ZAA										
470,000	MR_5E474ZAA										
560,000	MR_5E564ZAA										
680,000	MR_5E684ZAA										
820,000	MR_5E824ZAA										
1.0 μF	MR_5E105ZAA										
1.2 μF	MR_5E125ZAA										
1.5 μF	MR_5E155ZAA										
1.8 μF	MR_5E185ZAA										
2.2 μF	MR_5E225ZAA										
2.7 μF	MR_5E275ZAA										
3.3 μF	MR_5E335ZAA										
3.9 μF	MR_5E395ZAA										
4.7 μF	MR_5E475ZAA										
5.6 μF	MR_5E565ZAA										
6.8 μF	MR_5E685ZAA										
8.2 μF	MR_5E825ZAA										
10.0 μF	MR_5E106ZAA										
12.0 μF	MR_5E126ZAA										
15.0 μF	MR_5E156ZAA										

 For trimmed leads see "How To Order".  
 For other tolerances see "How To Order".  
 For other voltages see "How To Order".

 = Industry preferred values

\*Length, width and thickness dimensions are  $\pm 0.254$  mm ( $\pm 0.010$ "). Lead diameter is  $\pm 0.05$  mm ( $\pm 0.002$ "). Lead spacing is  $\pm 0.381$  mm ( $\pm 0.015$ ").

# Radial Leads/Packaging

## Tape and Reel

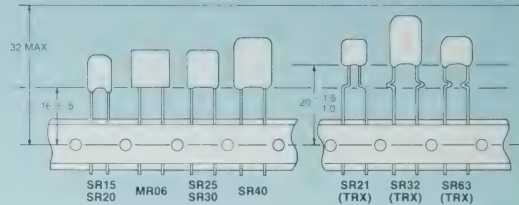
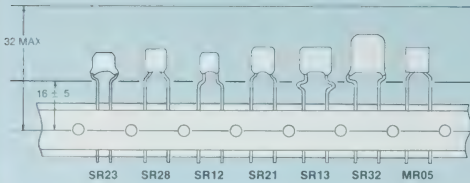
### GENERAL INFORMATION

1. Standard reel diameter is 355 millimeters (14 inches) maximum.
2. Reeling standard (#1 or #2) should be specified when ordering.
3. Reeling direction is offered in either configuration A or B. If not specified, configuration B will be supplied as standard.  
(See Page 25).

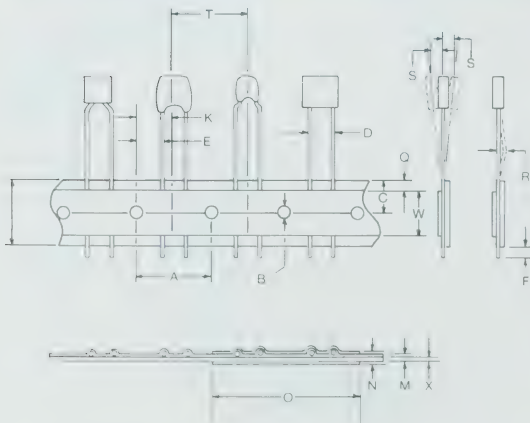
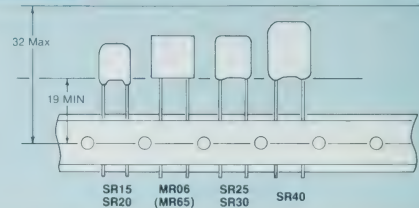
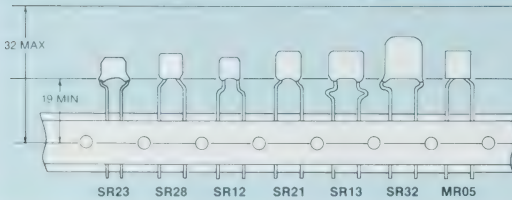
4. TRX designs for SR21, SR63, and SR32 may be specified by placing "TRX" at the end of the catalog number (example SR215C104KAATRX).

### STANDARD 1

DIMENSIONS IN MILLIMETERS



### STANDARD 2



### DESCRIPTION

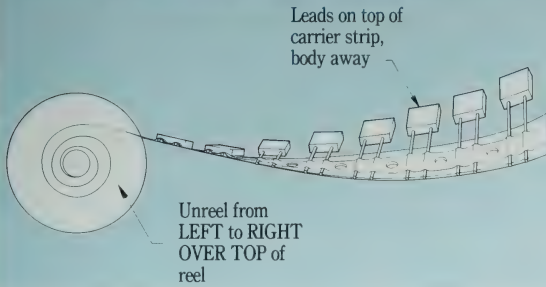
- A. Feed Hole Pitch
- B. Feed Hole Diameter
- C. Feed Hole Location
- D. Component Lead Spacing
- E. Component Lead Location
- F. Component Lead Protrusion  
(edge of carrier to cut end of lead)
- K. Component Body Location
- L. Carrier Tape Width
- M. Carrier Tape Assembly Thickness
- N. Carrier Tape Spliced Thickness
- O. Carrier Tape Spliced Length
- Q. Adhesive Tape Border
- R. Component Bent Leads (either direction)
- S. Component Misalignment
- T. Component Pitch
- W. Adhesive Tape Width
- X. Carrier Tape Thickness
- Y. Cumulative Pitch over 20 Pitches

### DIMENSIONS (MM)

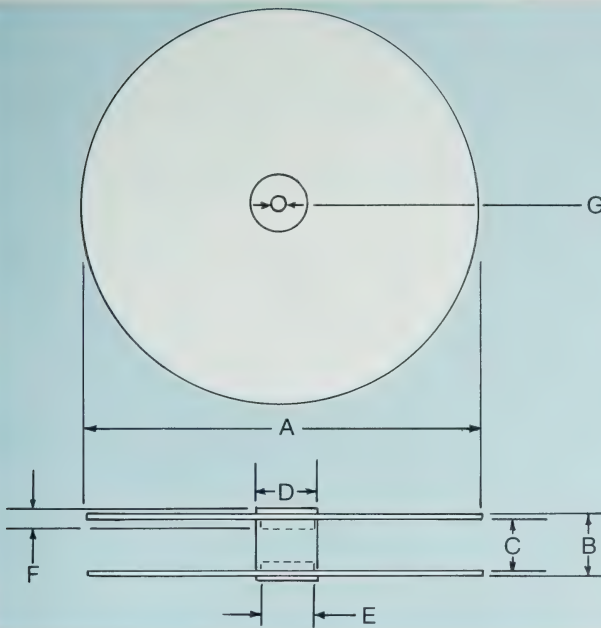
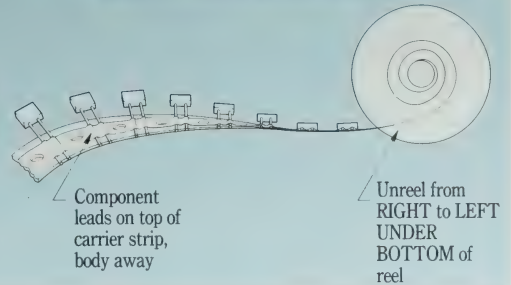
12.70 ± .20
3.99 ± .20
9.02 ± .51
5.00 <sup>+79</sup> / <sub>-20</sub> or 2.54 <sup>+79</sup> / <sub>-20</sub>
3.81 ± .51 or 5.00 ± .51 for 2.54 lead spacing
2.00 maximum
6.35 ± .41
18.01 <sup>+1.02</sup> / <sub>-.51</sub>
.71 ± .20
1.42 maximum
50.80 - 88.90
3.00 maximum
.79 maximum
.99 maximum
12.70 ± .99
12.50 <sup>+3.00</sup> / <sub>-.0</sub>
.51 ± .10
254 ± 2.00



### REEL CONFIGURATION A



### REEL CONFIGURATION B



#### DESCRIPTION

#### DIMENSIONS (MM)

A -- Reel Diameter	304.80 - 355
B -- Reel Outside Width	50.80 maximum
C -- Reel Inside Width	38.10 - 46.02
D -- Core Diameter (O.D.)	102.01 maximum
E -- Hub Recess Diameter	86.36 maximum
F -- Hub Recess Depth	9.50 minimum
G -- Arbor Hole Diameter	25.40 - 30.48

#### CONVERSION TABLE

MM	IN	MM	IN	MM	IN	MM	IN	MM	IN
.10	.004	1.52	.060	5.00	.197	9.91	.390	32.00	1.260
.20	.007	2.00	.079	5.08	.200	10.03	.395	38.10	1.500
.38	.015	2.54	.100	6.22	.245	10.16	.400	46.02	1.812
.41	.016	3.00	.118	6.35	.250	11.68	.460	50.80	2.000
.51	.020	3.18	.125	6.60	.260	12.50	.492	86.36	3.400
.71	.028	3.48	.137	6.99	.275	12.70	.500	88.90	3.500
.79	.031	3.81	.150	7.62	.300	16.00	.630	102.01	4.016
.99	.039	3.99	.157	8.89	.350	18.01	.709	254.00	10.000
1.02	.040	4.45	.175	9.02	.355	25.40	1.000	304.80	12.000
1.42	.056	4.98	.196	9.50	.374	30.48	1.200	355.00	14.000

# Two Pin DIP/DIPGuard®

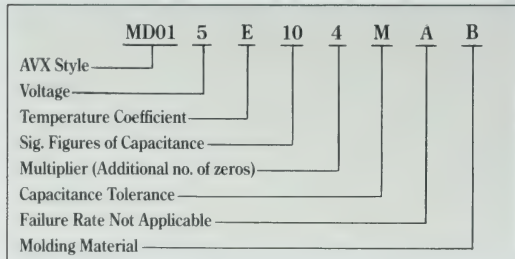
## GENERAL INFORMATION

AVX MD Series  
NPO (C0G), X7R, Z5U, Y5V Temperature Coefficients  
50, 100 Volts  
For established reliability DIPGuards see MIL-C-39014 section on page 52.

## HOW TO ORDER

AVX Styles: MD01, CKR22\*, MD02, CKR23\*, MD03, CKR24\*

### Part Number Example



### Part Number Codes

Voltages: 50V = 5, 100V = 1\*\*

Temp. Coefficient: NPO = A, X7R = C, Z5U = E, Y5V = G

**Sig. Figures of Capacitance and Multiplier:** First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104.

### Capacitance Tolerances:

NPO: F =  $\pm 1\%$ , J =  $\pm 5\%$ , K =  $\pm 10\%$

X7R: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

Z5U: M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$

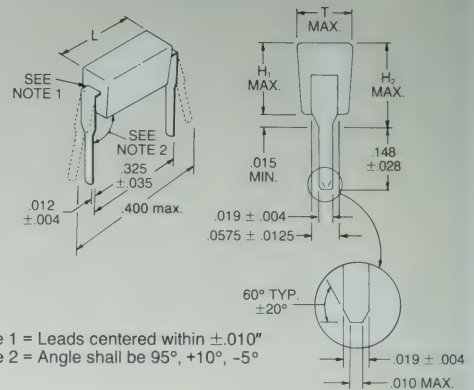
Y5V: M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$

**Failure Rate:** A = Not Applicable

**Molding Material:** A = Epoxy Thermal Set,  
B = Ryton Thermal Plastic

\* Reference pages 52 to 57.

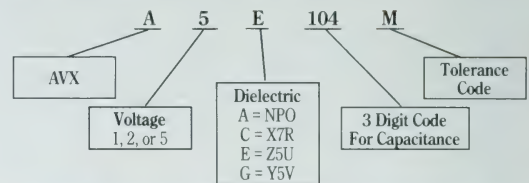
\*\* For 200V requirements consult factory.



## MARKING

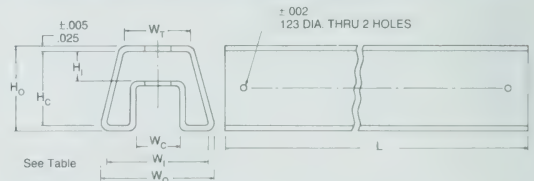
### Part Number Example MD015 E 104MAB

Top of Unit:



## PACKAGING REQUIREMENTS

**Standard Packaging:** 200 pieces per slide pack.



### Slide Package Dimensions

	MD01	MD02	MD03
(H <sub>0</sub> ) Overall Height	.400 ref.	.430 ref.	.545 ref.
(H <sub>c</sub> ) Channel Height	.141 ± .006	.171 ± .006	.295 ± .010
(H <sub>i</sub> ) Inside Height	.350	.380	.495
(W <sub>0</sub> ) Overall Width	.540 ref.	.540 ref.	.600 ref.
(W <sub>d</sub> ) Inside Width	.490	.490	.550
(W <sub>c</sub> ) Channel Width	.210	.210	.170
(W <sub>1</sub> ) Top Width	.350	.310	.300
(L) Length	20.073 ± .06	20.073 ± .06	20.073 ± .06



## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

AVX Style	Length (L)	Height (H <sub>1</sub> )	Height (H <sub>2</sub> )	Thickness
MD01	6.60 (.260 ± .020)	3.43 (.135 max.)	4.19 (.165 max.)	2.54 (.098 max.)
MD02	6.60 (.260 ± .020)	4.19 (.165 max.)	5.08 (.195 max.)	2.54 (.098 max.)
MD03	6.60 (.260 ± .020)	7.37 (.290 max.)	8.13 (.320 max.)	2.54 (.098 max.)

## MILITARY CROSS REFERENCE GUIDE

Dimensions: Millimeters (Inches)

AVX Style	MIL-C-39014	Length (L)	Height (H <sub>1</sub> )	Height (H <sub>2</sub> )	Thickness
MD01	CKR22	6.60 (.260 ± .020)	3.43 (.135 max.)	4.19 (.165 max.)	2.54 (.092 ± .006)
MD02	CKR23	6.60 (.260 ± .020)	4.19 (.162 max.)	5.08 (.185 max.)	2.54 (.092 ± .006)
MD03	CKR24	6.60 (.260 ± .020)	7.37 (.290 max.)	8.13 (.320 max.)	2.54 (.092 ± .006)

Note: For CKR22/23/24, see MIL-C-39014 section in the Military Section pages 48 thru 53.

## CAPACITANCE SPECIFICATIONS

EIA Characteristic		NPO	
AVX Style		MD01	
Cap. in pF*		WVDC	100 50
10	MD015A100KAB		
15	MD015A150KAB		
22	MD015A220KAB		
33	MD015A330KAB		
47	MD015A470KAB		
68	MD015A680KAB		
100	MD015A101KAB		
150	MD015A151KAB		
220	MD015A221KAB		
330	MD015A331KAB		
470	MD015A471KAB		
680	MD015A681KAB		
1000	MD015A102KAB		
1500	MD015A152KAB		
2200	MD015A222KAB		
3300	MD015A332KAB		
AVX Style		MD02	
Cap. in pF*		WVDC	100 50
4700	MD025A472KAA		
6800	MD025A682KAA		
10000	MD025A103KAA		

EIA Characteristic		X7R	
AVX Style		MD01	
Cap. in pF*		WVDC	100 50
220	MD015C221KAB		
330	MD015C331KAB		
470	MD015C471KAB		
680	MD015C681KAB		
1000	MD015C102KAB		
1500	MD015C152KAB		
2200	MD015C222KAB		
3300	MD015C332KAB		
4700	MD015C472KAB		
6800	MD015C682KAB		
10,000	MD011C103KAB		
15,000	MD015C153KAB		
22,000	MD015C223KAB		
33,000	MD015C333KAB		
47,000	MD015C473KAB		
68,000	MD015C683KAB		
100,000	MD015C104KAB		
AVX Style		MD02	
Cap. in pF*		WVDC	100 50
150,000	MD025C154KAB		
220,000	MD025C224KAB		
AVX Style		MD03	
Cap. in pF*		WVDC	100 50
330,000	MD035C334KAA		
470,000	MD035C474KAA		
680,000	MD035C684KAA		
1,000,000	MD035C105KAA		

EIA Characteristic		Z5U	
AVX Style		MD01	
Cap. in pF*		WVDC	100 50
10,000	MD015E103ZAB		
15,000	MD015E153ZAB		
22,000	MD015E223ZAB		
33,000	MD015E333ZAB		
47,000	MD015E473ZAB		
68,000	MD015E683ZAB		
100,000	MD015E104ZAB		
150,000	MD015E154ZAB		
220,000	MD015E224ZAB		
330,000	MD015E334ZAB		
AVX Style		MD02	
Cap. in pF*		WVDC	100 50
470,000	MD025E474ZAB		
AVX Style		MD03	
Cap. in pF*		WVDC	100 50
680,000	MD035E684ZAA		
1,000,000	MD035E105ZAA		
EIA Characteristic		Y5V	
AVX Style		MD02	
Cap. in pF*		WVDC	100 50
1,000,000	MD025G105ZAB		

For other voltages and tolerances see Part No. Codes.

For other voltages and tolerances see Part No. Codes  
\*Other capacitance values available upon special request.

For other voltages and tolerances see Part No. Codes

■ = Industry preferred values

# Axial Leads/SpinGuard

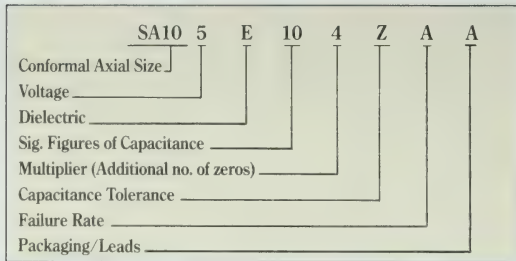
## GENERAL DESCRIPTION

**AVX SA Series**  
**Conformally Coated Axial Leaded MLC**  
**Temperature Coefficients: NPO, X7R, Z5U**  
**50, 100, 200 Volts**  
**Case Material: Epoxy (Flame Retardant to UL Bulletin 492, Par. 280)**  
**Lead Material: Solderable**

## FORM FACTOR

AVX Styles: SA10, SA11, SA20, SA30, SA40

Part Number Example



## Part Number Codes

**Voltages:** 50V = 5, 100V = 1, 200V = 2

**Dielectric:** NPO = A, X7R = C, Z5U = E

**Sig. Figures of Capacitance and Multiplier:** First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R4 = 1.4 pF).

## Capacitance Tolerances:

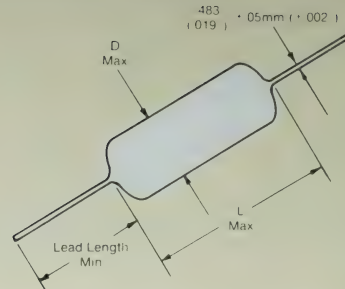
NPO: C =  $\pm 0.25$  pF, D =  $\pm 5$  pF, F =  $\pm 1\%$ , G =  $\pm 2\%$ , J =  $\pm 5\%$ , K =  $\pm 10\%$

X7R: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

Z5U: M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$

**Failure Rate:** Standard

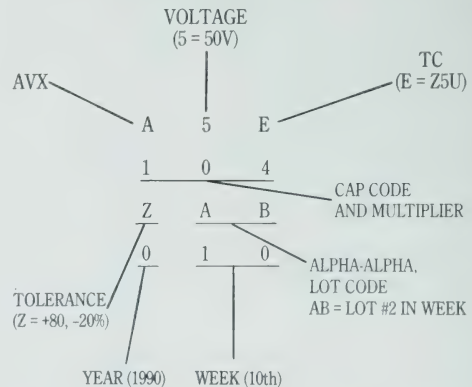
**Leads:** Standard (Solderable)



## SpinGuard Identification

SpinGuard marking includes full date code/lot code identification. A first in the industry, this format provides complete traceability to all manufacturing processes involving the basic chip and final assembly. Total Shipment traceability is also provided.

SA105E104ZAA  
 LOT CODE/DATE CODE  
 = 010AB



## PACKAGING INFORMATION

A = Standard Reels (see Page 42)  
 B = 1000 piece reels (distributors only)  
 C = Ammo Pack (see Page 42)  
 D thru J = See Special Lead Configurations (Page 33)



# NPO Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)

AVX Style		SA10			SA11		SA20		SA30		SA40	
Length (L)		4.32 (.170")			4.32 (.170")		6.60 (.260")		7.37 (.290")		10.16 (.400")	
Diameter (D)		2.54 (.100")			3.05 (.120")		2.54 (.100")		3.81 (.150")		3.81 (.150")	
Lead Diameter		.483 (.019")			.483 (.019")		.483 (.019")		.483 (.019")		.483 (.019")	
Lead Length		25.4 (1.00")			25.4 (1.00")		25.4 (1.00")		25.4 (1.00")		25.4 (1.00")	
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC		WVDC		WVDC		WVDC	
		200	100	50	100	50	100	50	100	50	100	50
1.0* ↓ 9.1*	SA102A1R0DAA ↓ SA102A9R1DAA											
10 12 15	SA102A100JAA SA102A120JAA SA102A150JAA											
18 22 27	SA102A180JAA SA102A220JAA SA102A270JAA											
33 39 47	SA102A330JAA SA102A390JAA SA102A470JAA											
56 68 82	SA102A560JAA SA102A680JAA SA102A820JAA											
100 120 150	SA102A101JAA SA102A121JAA SA101A151JAA											
180 220 270	SA101A181JAA SA101A221JAA SA101A271JAA											
330 390 470	SA101A331JAA SA101A391JAA SA101A471JAA											
560 680 820	SA101A561JAA SA101A681JAA SA101A821JAA											
1000 1200 1500	SA105A102JAA SA201A122JAA SA201A152JAA											
1800 2200 2700	SA205A182JAA SA301A222JAA SA301A272JAA											
3300 3900 4700	SA301A332JAA SA301A392JAA SA305A472JAA											
5600 6800 8200	SA401A562JAA SA401A682JAA SA405A822JAA											
10,000 12,000	SA405A103JAA SA405A123JAA											

For other tolerances see Part No. Codes

For other voltages see Part No. Codes

AVX Style

 = Industry preferred values

\*\*"C & D" Tolerance Only

# Axial Leads/SpinGuard™

## X7R Dielectric SIZE AND CAPACITANCE SPECIFICATIONS


Dimensions: Millimeters (Inches)

AVX Style		SA10			SA11			SA20			SA30			SA40		
Length (L)		4.32 (.170")			4.32 (.170")			6.60 (.260")			7.37 (.290")			10.16 (.400")		
Diameter (D)		2.54 (.100")			3.05 (.120")			2.54 (.100")			3.81 (.150")			3.81 (.150")		
Lead Diameter		.483 (.019")			.483 (.019")			.483 (.019")			.483 (.019")			.483 (.019")		
Lead Length		25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")		
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	100	50		100	50		100	50		100	50	
220	SA102C221KAA															
270	SA102C271KAA															
330	SA102C331KAA															
390	SA102C391KAA															
470	SA102C471KAA															
560	SA101C561KAA															
680	SA101C681KAA															
820	SA101C821KAA															
1000	SA101C102KAA															
1200	SA101C122KAA															
1500	SA101C152KAA															
1800	SA101C182KAA															
2200	SA101C222KAA															
2700	SA101C272KAA															
3300	SA101C332KAA															
3900	SA101C392KAA															
4700	SA101C472KAA															
5600	SA101C562KAA															
6800	SA101C682KAA															
8200	SA105C822KAA															
10,000	SA105C103KAA															
12,000	SA105C123KAA															
15,000	SA105C153KAA															
18,000	SA105C183KAA															
22,000	SA105C223KAA															
27,000	SA205C273KAA															
33,000	SA205C333KAA															
39,000	SA205C393KAA															
47,000	SA205C473KAA															
56,000	SA305C563KAA															
68,000	SA305C683KAA															
82,000	SA305C823KAA															
100,000	SA115C104KAA															
120,000	SA405C124KAA															
150,000	SA405C154KAA															
180,000	SA405C184KAA															
220,000	SA405C224KAA															
270,000	SA405C274KAA															
330,000	SA405C334KAA															
470,000	SA405C474KAA															

For other tolerances see Part No. Codes

For other voltages see Part No. Codes

AVX Style

 = Industry preferred values



# Z5U Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)




AVX Style		SA10		SA11		SA20		SA30		SA40	
Length (L)		4.32 (.170")		4.32 (.170")		6.60 (.260")		7.37 (.290")		10.16 (.400")	
Diameter (D)		2.54 (.100")		3.05 (.120")		2.54 (.100")		3.81 (.150")		3.81 (.150")	
Lead Diameter		.483 (.019")		.483 (.019")		.483 (.019")		.483 (.019")		.483 (.019")	
Lead Length		25.4 (1.00")		25.4 (1.00")		25.4 (1.00")		25.4 (1.00")		25.4 (1.00")	
Cap. in pF	Typical AVX Part Nos.	WVDC		WVDC		WVDC		WVDC		WVDC	
		100	50	100	50	100	50	100	50	100	50
10,000 15,000 22,000	SA105E103ZAA SA105E153ZAA SA105E223ZAA										
33,000 47,000 68,000	SA105E333ZAA SA105E473ZAA SA105E683ZAA										
*100,000 150,000 220,000	SA105E104ZAA SA105E154ZAA SA105E224ZAA										
330,000 470,000 680,000	SA115E334ZAA SA305E474ZAA SA305E684ZAA										
820,000 1,000,000	SA305E824ZAA SA305E105ZAA										

For other tolerances see Part No. Codes

For other voltages see Part No. Codes

AVX Style

 = Industry preferred values

\*Preferred Industry Decoupling Capacitor — Insertable on .300" centers.  
SA105E104ZAA

# Axial Leads/SpinGuard™

## Extended Range SpinGuards

### MECHANICAL SPECIFICATIONS

#### Capacitance Range

220,000 pF, 330,000 pF, 1,000,000 pF

#### Capacitance Tolerances

±20%, [+80 -20]%

#### Operating Temperature Range

Z5U = +10°C to +85°C

#### Temperature Characteristics

E = Z5U

#### Voltage Ratings

50 Vdc

#### Dissipation Factor 25°C

Z5U = 4.0% max. at 1 KHz, .3 VRMS

#### Insulation Resistance 25°C (MIL-STD-202-Method 302)

Z5U = 10 K megohms or 100 megohms -  $\mu$ F minimum, whichever is less

#### Dielectric Strength

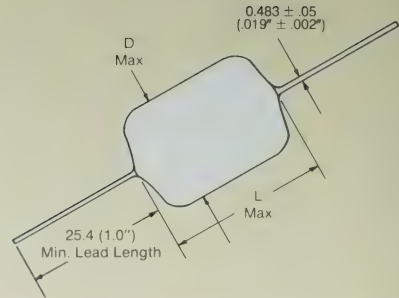
Z5U = 200% of rated voltage

#### Moisture Resistance (MIL-STD-202-Method 106)

#### Immersion Cycling (MIL-STD-202-Method 104, condition B)

For current reliability information, consult factory.

Dimensions: Millimeters  
(Inches)



### ELECTRICAL PERFORMANCE CHARACTERISTICS AT 25°C (77°F) UNDER DC BIAS

Parameter	Test Conditions	Mi.	Typ.	Max.	Unit
$V_L$	di/dt = 200 ma/10 ns	—	80	90	mv
Inductance, L		—	4.0	4.5	nh
dv/dt	20 ns after pulse				
	di/dt = 200 ma/10 ns	—	0.53	—	mv/ns
Capacitance, C		.24	.33	—	$\mu$ F
ESR	Resonance Freq., 4-5 MHz	—	.03	.08	$\Omega$
Impedance (Total)	100 MHz (HP - 4192A)	—	4.4	5.0	$\Omega$
Recovery Time, $t_R$		—	20	—	ns

### INDUCTANCE CAPACITANCE

Dimensions: Millimeters (Inches)

AVX Style	SA11*	SA30
Length (L)	4.32 (.170")	7.37 (.290")
Diameter (D)	3.05 (.120")	3.81 (.150")
0.22 $\mu$ F	SA115E224ZAA	
0.33 $\mu$ F	**SA115E334ZAA	
1.0 $\mu$ F	SA305E105ZAA	

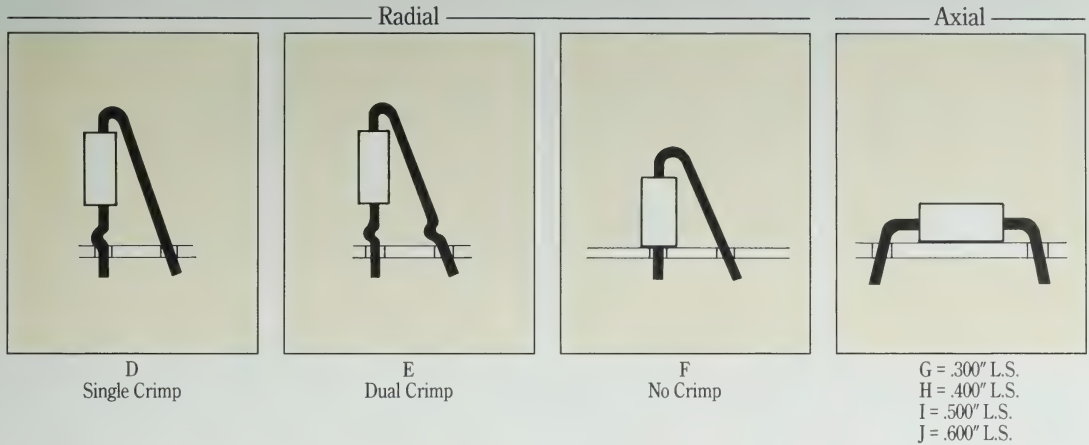
\* Automatically insertable on 0.300" centers (see page 42 for reel packing details)

\*\* RAMGuard: the 0.33  $\mu$ F value capacitance is recommended for decoupling 256K and 1 Meg Dynamic RAMs.



## Special Lead Configurations

Dimensions—Body dimensions Per Standard SpinGuard Configurations.  
Formed dimensions as shown for types D, E, F, G, H, I, & J configurations.



Formed Dimensions:

	LEAD SPACING*	SEATED HEIGHT (Max.)		
		D & E	F	G, H, I & J
SA10	Nom. .2"	.525"	.300"	.100"
SA20	.2"	.570"	.375"	.100"
SA30	.2"	.580"	.425"	.150"
SA40	.2"	.650"	.460"	.150"

\*Lead spacing can be varied by user to cover .1".3" spacing requirements for F, D, and E styles.



# Axial Leads/Glass Encapsulation

## AXIAL LEAD DESCRIPTION

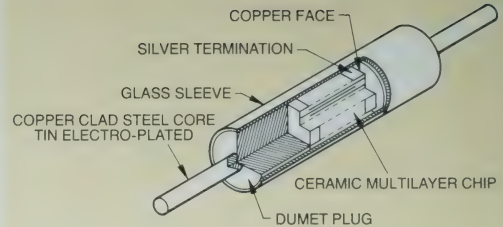
**Lead Pull & Torsion** per MIL-STD-202, Method 211, Condition A & D  
**Resistance to Soldering Heat** per MIL-STD-202, Method 210, Condition B  
**Hermeticity** per MIL-STD-202, Method 112, Condition C procedure III a.  
 (Glass only)

**Vibration and Shock** per MIL-STD-202, Method 204, Condition B and Method 213, Condition I

**Thermal Shock** per MIL-STD-202, Method 107, Condition A (125°C)

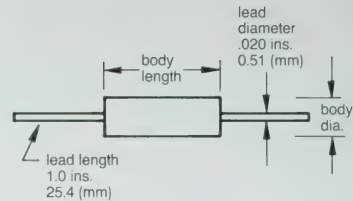
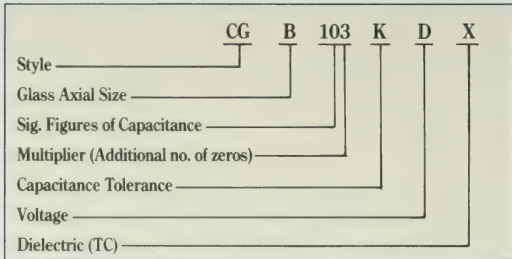
**Moisture Resistance** per MIL-STD-202, Method 106 (20 cycles)

**Life** per MIL-C-39014



**Glass Axial-Leaded Capacitor**

## Part Number Example



## Part Number Codes

**Glass Axial Size:** A = .170 × .075, B = .170 × .100, D = .260 × .100,  
 E = .300 × .110, F = .400 × .150

**Sig. Figures of Capacitance and Multiplier:** First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104.

## Capacitance Tolerances:

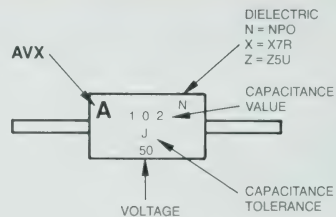
NPO: F = ±1%, G = ±2%, J = ±5%, K = ±10%, M = ±20%

X7R: J = ±5%, K = ±10%, M = ±20%

Z5U: M = ±20%, Z = +80%, -20%, V = GMV

**Voltage:** D = 50V, E = 100V, F = 200V

**Dielectric:** NPO = N, X7R = X, Z5U = Z





# NPO Dielectric

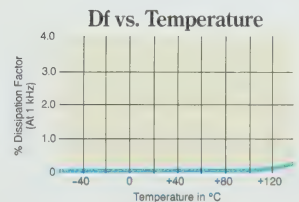
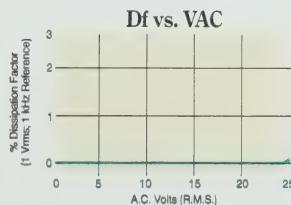
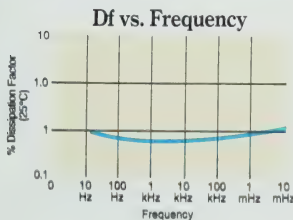
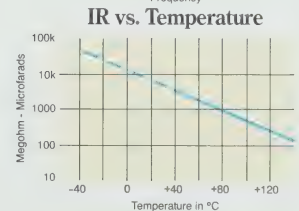
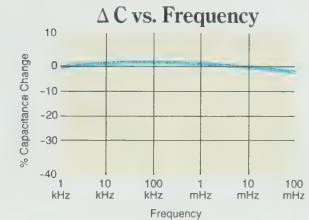
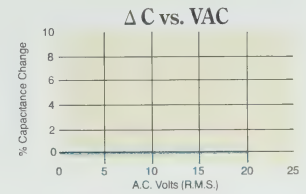
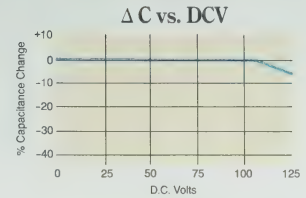
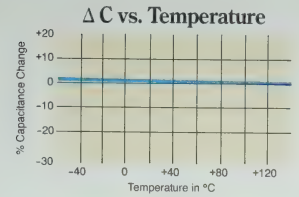
## SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Package	B	D	E	F	EIA Capacitance Code
Body Length (max)	4.32 (.170")	6.60 (.260")	7.62 (.300")	10.16 (.400")	
Body Dia. (max)	2.54 (.100")	2.54 (.100")	2.79 (.110")	3.81 (.150")	
Cap. in pF	Voltage 50 100	Voltage 50 100	Voltage 50 100	Voltage 50 100	
10					100
12					120
15					150
18					180
22					220
27					270
33					330
39					390
47					470
56					560
68					680
82					820
100					101
120					121
150					151
180					181
220					221
270					271
330					331
390					391
470					471
560					561
680					681
820					821
1000					102
1200					122
1500					152
1800					182
2200					222
2700					272
3300					332
3900					392
4700					472
5600					562
6800					682
8200					822
.01μF					103

= Industry preferred values

## TYPICAL PERFORMANCE CURVES



# Axial Leads/Glass Encapsulation

## X7R Dielectric

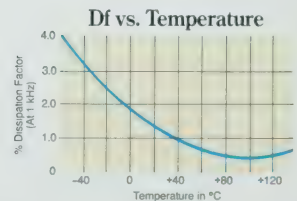
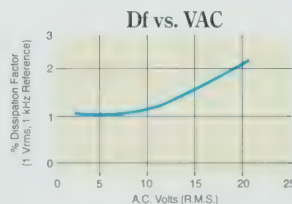
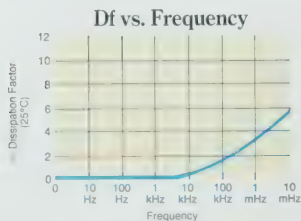
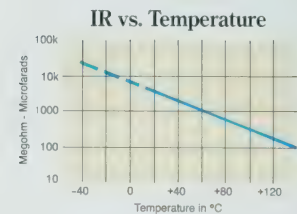
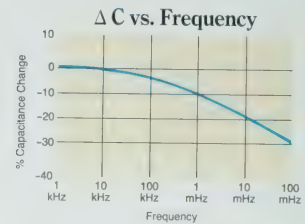
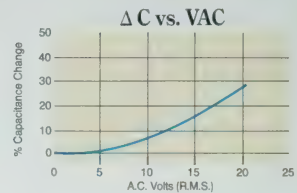
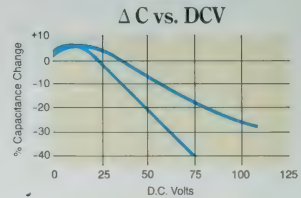
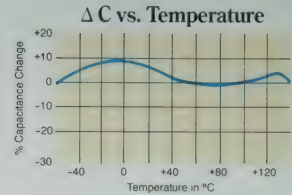
### SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Package	A		B		D		E		F		EIA Capacitance Code
Body Length (max)	4.32 (.170")		4.32 (.170")		6.60 (.260")		7.62 (.300")		10.16 (.400")		
Body Dia. (max)	1.91 (.075")		2.54 (.100")		2.54 (.100")		2.79 (.110")		3.81 (.150")		
Cap. in pF	Voltage 50 100		Voltage 50 100		Voltage 50 100		Voltage 50 100		Voltage 50 100		
100											101
120											121
150											151
180											181
220											221
270											271
330											331
390											391
470											471
560											561
680											681
820											821
1000											102
1200											122
1500											152
1800											182
2200											222
2700											272
3300											332
3900											392
4700											472
5600											562
6800											682
8200											822
.01 $\mu$ F											103
.012											123
.015											153
.018											183
.022											223
.027											273
.033											333
.039											393
.047											473
.056											563
.068											683
.082											823
.10											104
.12											124
.15											154
.18											184
.22											224
.33											334
.39											394
.47											474

= Industry preferred values

### TYPICAL PERFORMANCE CURVES





# Z5U Dielectric

## SIZE AND CAPACITANCE SPECIFICATIONS

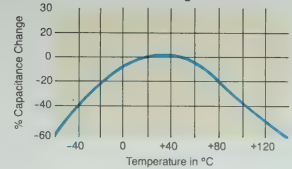
Dimensions: Millimeters (Inches)

Package	A		B		D		E		F		EIA Capacitance Code
Body Length (max)	4.32 (.170")		4.32 (.170")		6.60 (.260")		7.62 (.300")		10.16 (.400")		
Body Dia. (max)	1.91 (.075")		2.54 (.100")		2.54 (.100")		2.79 (.110")		3.81 (.150")		
Cap. in pF	Voltage 50 100		Voltage 50 100		Voltage 50 100		Voltage 50 100		Voltage 50 100		
1000 1200 1500											102 122 152
1800 2200 2700											182 222 272
3300 3900 4700											332 392 472
5600 6800 8200											562 682 822
.01 $\mu$ F .012 .015											103 123 153
.018 .022 .027											183 223 273
.033 .039 .047											333 393 473
.056 .068 .082											563 683 823
.10 .12 .15											104 124 154
.18 .22 .27											184 224 274
.33 .39 .47											334 394 474
.56 .68 .82											564 684 824
1.0											105

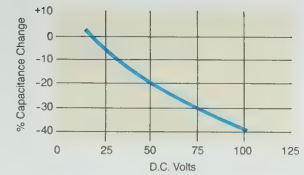
= Industry preferred values

## TYPICAL PERFORMANCE CURVES

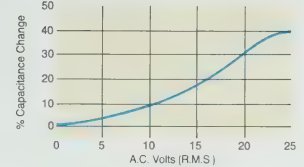
$\Delta C$  vs. Temperature



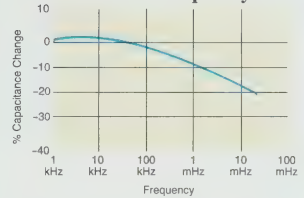
$\Delta C$  vs. DCV



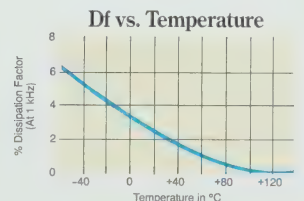
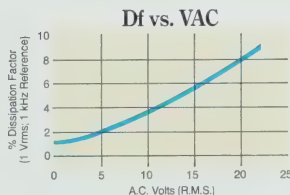
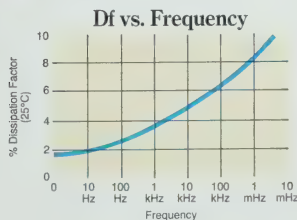
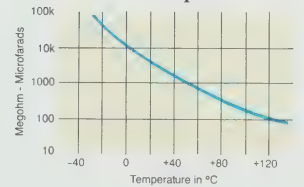
$\Delta C$  vs. VAC



$\Delta C$  vs. Frequency



IR vs. Temperature



# Axial Leads/Ceratum®

## PRODUCT DESCRIPTION

AVX MA Series  
Molded Axial Leaded MLC  
Temperature Coefficient: NPO, X7R, Z5U  
50V, 100V and 200V  
Case Material: Molded Epoxy  
Lead Material: Solderable

## PART NUMBERING

AVX Styles: MA10, MA20, MA30, MA40, MA50, MA60

Part Number Example

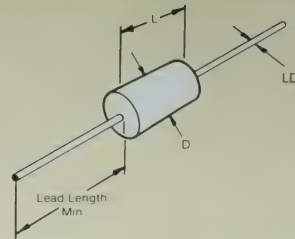
	MA10	5	E	10	4	Z	A	A
Molded Axial Size								
Voltage								
Dielectric								
Sig. Figures of Capacitance								
Multiplier (Additional no. of zeros)								
Capacitance Tolerance								
Failure Rate								
Leads								

Part Number Codes

Voltages: 50V = 5, 100V = 1, 200V = 2

Dielectric: NPO = A, X7R = C, Z5U = E

**Sig. Figures of Capacitance and Multiplier:** First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R4 = 1.4 pF).



Capacitance Tolerances:

NPO: F =  $\pm 1.0\%$ , J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$ ,

D =  $\pm 5\text{pF}$  < 10 pF only

X7R: J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

Z5U: M =  $\pm 20\%$ , Z =  $+80\%$ ,  $-20\%$

Failure Rate: Standard

Leads: Standard

‡ C tolerance available NPO from 1.0 to 9.1 pF only. Minimum tolerance for values 10 pF - 100 pF is D or F whichever is greater.

## DATE CODING

Line 1, A (for AVX), 5 = 50 Volts (V is optional), E = TC

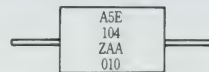
Line 2, 104Z = Capacitance Code

Line 3, Tolerance, 2 digit Lot Code

Date Code: 0 = 1990

10 = Week

Four Digit Date Code Optional



## MILITARY CROSS REFERENCE AND DIMENSIONS GUIDE

AVX Style	Per MIL-Spec			Case Size		
	MIL-C-11015	MIL-C-39014	MIL-C-20	Length (L)	Diameter (D)	Lead Diameter (LD)
MA10	CK12	CKR11	CCR75/CC75	4.07 $\pm$ .25 (.160" $\pm$ .010")	2.29 $\pm$ .25 (.090" $\pm$ .010")	.48 $\pm$ .05 (.019 $\pm$ .002")
MA20	CK13	CKR12	CCR76/CC76	6.35 $\pm$ .25 (.250" $\pm$ .010")	2.29 $\pm$ .25 (.090" $\pm$ .010")	.48 $\pm$ .05 (.019 $\pm$ .002")
MA40	CK14	CKR14	CCR77/CC77	9.91 $\pm$ .25 (.390" $\pm$ .010")	3.36 $\pm$ .25 (.140" $\pm$ .010")	.63 $\pm$ .05 (.025 $\pm$ .002")
MA50	CK15	CKR15	CCR78/CC78	12.7 $\pm$ .51 (.500" $\pm$ .020")	6.35 $\pm$ .38 (.250" $\pm$ .015")	.63 $\pm$ .05 (.025 $\pm$ .002")
MA60	CK16	CKR16	CCR79/CC79	17.53 $\pm$ .51 (.690" $\pm$ .020")	8.89 $\pm$ .51 (.350" $\pm$ .015")	.63 $\pm$ .05 (.025 $\pm$ .002")

For Military/Established Reliability Molded/Axial Lead see MIL-C-11015, MIL-C-39014, MIL-C-20 Section.

Dimensions: Millimeters (Inches)






# NPO Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)



AVX Style		MA10			MA20			MA30			MA40			MA50			MA60		
Length		4.07 ± .25 (.160" ± .010")			6.35 ± .25 (.250" ± .010")			6.09 ± .25 (.240" ± .010")			9.91 ± .25 (.390" ± .010")			12.7 ± .51 (.500" ± .020")			17.53 ± .51 (.690" ± .020")		
Diameter		2.29 ± .25 (.090" ± .010")			2.29 ± .25 (.090" ± .010")			3.30 ± .25 (.130" ± .010")			3.36 ± .25 (.140" ± .010")			6.35 ± .38 (.250" ± .015")			8.89 ± .51 (.350" ± .015")		
Lead Diameter		.48 ± .05 (.019" ± .002")			.48 ± .05 (.019" ± .002")			.48 ± .05 (.019" ± .002")			.63 ± .05 (.025" ± .002")			.63 ± .05 (.025" ± .002")			.63 ± .05 (.025" ± .002")		
Lead Length		25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")		
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	200	100	50	200	100	50	200	100	50	200	100	50	200	100	50
1.0 to 9.1	MA_5A1R0DAA MA_5A9R1DAA																		
10 12 15	MA_5A100KAA MA_5A120KAA MA_5A150KAA																		
18 22 27	MA_5A180KAA MA_5A220KAA MA_5A270KAA																		
33 39 47	MA_5A330KAA MA_5A390KAA MA_5A470KAA																		
56 68 82	MA_5A560KAA MA_5A680KAA MA_5A820KAA																		
100 120 150	MA_5A101KAA MA_5A121KAA MA_5A151KAA																		
180 220 270	MA_5A181KAA MA_5A221KAA MA_5A271KAA																		
330 390 470	MA_5A331KAA MA_5A391KAA MA_5A471KAA																		
560 680 820	MA_5A561KAA MA_5A681KAA MA_5A821KAA																		
1000 1200 1500	MA_5A102KAA MA_5A122KAA MA_5A152KAA																		
1800 2200 2700	MA_5A182KAA MA_5A222KAA MA_5A272KAA																		
3300 3900 4700	MA_5A332KAA MA_5A392KAA MA_5A472KAA																		
5600 6800 8200	MA_5A562KAA MA_5A682KAA MA_5A822KAA																		
10,000 12,000 15,000	MA_5A103KAA MA_5A123KAA MA_5A153KAA																		
18,000 22,000 27,000	MA_5A183KAA MA_5A223KAA MA_5A273KAA																		
33,000 39,000 47,000	MA_5A333KAA MA_5A393KAA MA_5A473KAA																		
56,000 68,000 82,000	MA_5A563KAA MA_5A683KAA MA_5A823KAA																		
100,000 120,000 150,000	MA_5A104KAA MA_5A124KAA MA_5A154KAA																		


 For other tolerances see Part No. Codes  
 For other voltages see Part No. Codes  
 AVX Style

# Axial Leads/Ceramic

## X7R Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

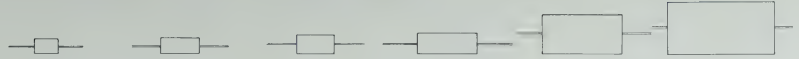
Dimensions: Millimeters (Inches)

AVX Style		MA10	MA20	MA30	MA40	MA50	MA60
Length		4.07 ± .25 (.160" ± .010")	6.35 ± .25 (.250" ± .010")	6.09 ± .25 (.240" ± .010")	9.91 ± .25 (.390" ± .010")	12.7 ± .51 (.500" ± .020")	17.53 ± .51 (.690" ± .020")
Diameter		2.29 ± .25 (.090" ± .010")	2.29 ± .25 (.090" ± .010")	3.30 ± .25 (.130" ± .010")	3.36 ± .25 (.140" ± .010")	6.35 ± .38 (.250" ± .015")	8.89 ± .51 (.350" ± .015")
Lead Diameter		.48 ± .05 (.019" ± .002")	.48 ± .05 (.019" ± .002")	.48 ± .05 (.019" ± .002")	.63 ± .05 (.025" ± .002")	.63 ± .05 (.025" ± .002")	.63 ± .05 (.025" ± .002")
Lead Length		25.4 (1.00")	25.4 (1.00")	25.4 (1.00")	25.4 (1.00")	25.4 (1.00")	25.4 (1.00")
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC		
		200	100	50	200	100	50
220	MA 5C221KAA						
270	MA 5C271KAA						
330	MA 5C331KAA						
390	MA 5C391KAA						
470	MA 5C471KAA						
560	MA 5C561KAA						
680	MA 5C681KAA						
820	MA 5C821KAA						
1000	MA 5C102KAA						
1200	MA 5C122KAA						
1500	MA 5C152KAA						
1800	MA 5C182KAA						
2200	MA 5C222KAA						
2700	MA 5C272KAA						
3300	MA 5C332KAA						
3900	MA 5C392KAA						
4700	MA 5C472KAA						
5600	MA 5C562KAA						
6800	MA 5C682KAA						
8200	MA 5C822KAA						
10,000	MA 5C103KAA						
12,000	MA 5C123KAA						
15,000	MA 5C153KAA						
18,000	MA 5C183KAA						
22,000	MA 5C223KAA						
27,000	MA 5C273KAA						
33,000	MA 5C333KAA						
39,000	MA 5C393KAA						
47,000	MA 5C473KAA						
56,000	MA 5C563KAA						
68,000	MA 5C683KAA						
82,000	MA 5C823KAA						
100,000	MA 5C104KAA						
120,000	MA 5C124KAA						
150,000	MA 5C154KAA						
180,000	MA 5C184KAA						
220,000	MA 5C224KAA						
270,000	MA 5C274KAA						
330,000	MA 5C334KAA						
390,000	MA 5C394KAA						
470,000	MA 5C474KAA						
560,000	MA 5C564KAA						
680,000	MA 5C684KAA						
820,000	MA 5C824KAA						
1.0 μF	MA 5C106KAA						
1.2 μF	MA 5C126KAA						
1.5 μF	MA 5C156KAA						
1.8 μF	MA 5C186KAA						
2.2 μF	MA 5C226KAA						
2.7 μF	MA 5C276KAA						
3.3 μF	MA 5C336KAA						
3.9 μF	MA 5C396KAA						

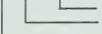
 For other tolerances see Part No. Codes  
 For other voltages see Part No. Codes  
 AVX Style

# Z5U Dielectric SIZE AND CAPACITANCE SPECIFICATIONS

Dimensions: Millimeters (Inches)



AVX Style		MA10			MA20			MA30			MA40			MA50			MA60		
Length		4.07 ± .25 (.160" ± .010")			6.35 ± .25 (.250" ± .010")			6.09 ± .25 (.240" ± .010")			9.91 ± .25 (.390" ± .010")			12.7 ± .51 (.500" ± .020")			17.53 ± .51 (.690" ± .020")		
Diameter		2.29 ± .25 (.090" ± .010")			2.29 ± .25 (.090" ± .010")			3.30 ± .25 (.130" ± .010")			3.36 ± .25 (.140" ± .010")			6.35 ± .38 (.250" ± .015")			8.89 ± .51 (.350" ± .015")		
Lead Diameter		.48 ± .05 (.019" ± .002")			.48 ± .05 (.019" ± .002")			.48 ± .05 (.019" ± .002")			.63 ± .05 (.025" ± .002")			.63 ± .05 (.025" ± .002")			.63 ± .05 (.025" ± .002")		
Lead Length		25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")			25.4 (1.00")		
Cap. in pF	Typical AVX Part Nos.	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC		
		200	100	50	200	100	50	200	100	50	200	100	50	200	100	50	200	100	50
1000	MA_5E102ZAA																		
1200	MA_5E122ZAA																		
1500	MA_5E152ZAA																		
1800	MA_5E182ZAA																		
2200	MA_5E222ZAA																		
2700	MA_5E272ZAA																		
3300	MA_5E332ZAA																		
3900	MA_5E392ZAA																		
4700	MA_5E472ZAA																		
5600	MA_5E562ZAA																		
6800	MA_5E682ZAA																		
8200	MA_5E822ZAA																		
10,000	MA_5E103ZAA																		
12,000	MA_5E123ZAA																		
15,000	MA_5E153ZAA																		
18,000	MA_5E183ZAA																		
22,000	MA_5E223ZAA																		
27,000	MA_5E273ZAA																		
33,000	MA_5E333ZAA																		
39,000	MA_5E393ZAA																		
47,000	MA_5E473ZAA																		
56,000	MA_5E563ZAA																		
68,000	MA_5E683ZAA																		
82,000	MA_5E823ZAA																		
100,000	MA_5E104ZAA																		
120,000	MA_5E124ZAA																		
150,000	MA_5E154ZAA																		
180,000	MA_5E184ZAA																		
220,000	MA_5E224ZAA																		
270,000	MA_5E274ZAA																		
330,000	MA_5E334ZAA																		
390,000	MA_5E394ZAA																		
470,000	MA_5E474ZAA																		
560,000	MA_5E564ZAA																		
680,000	MA_5E684ZAA																		
820,000	MA_5E824ZAA																		
1.0 µF	MA_5E105ZAA																		
1.2 µF	MA_5E125ZAA																		
1.5 µF	MA_5E155ZAA																		
1.8 µF	MA_5E185ZAA																		
2.2 µF	MA_5E225ZAA																		
2.7 µF	MA_5E275ZAA																		
3.3 µF	MA_5E335ZAA																		
3.9 µF	MA_5E395ZAA																		
4.7 µF	MA_5E475ZAA																		
5.6 µF	MA_5E565ZAA																		
6.8 µF	MA_5E685ZAA																		
8.2 µF	MA_5E825ZAA																		

 For other tolerances see Part No. Codes  
 For other voltages see Part No. Codes  
 AVX Style

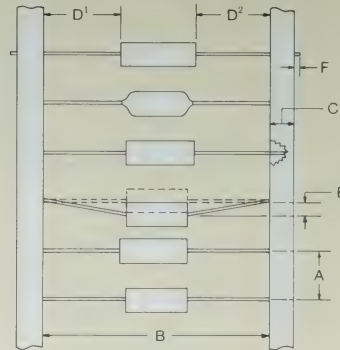


# Axial Leads/Packaging

## AXIAL LEADS

### CLASS I RS-296

A.	5mm ± 0.5mm (.200" ± 0.020")
B*	52.4mm ± 1.5mm (2.063" ± 0.059")
C.	6.35mm ± 0.4mm (0.250" ± 0.016")
D <sup>1</sup> -D <sup>2</sup> .	1.4mm (0.055" MAX.)
E.	1.2mm (0.047" MAX.)
F.	1.6mm (0.063" MAX.)
G.	356mm (14.00")
H.	76mm (3.000")
I.	25.4mm (1.000")
J.	84mm (3.300")
K.	70mm (2.750")

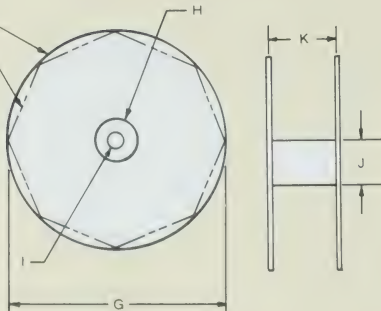


Leader Tape: 300mm min. (12")

Splicing: Tape Only

Missing Parts: 0.25% of component count max.-No consecutive missing parts

Optional Design



## QUANTITIES AVAILABLE

SA10	7,500 pcs.	MA10	5,000 pcs.
SA11	5,000 pcs.	MA20	5,000 pcs.
SA20	5,000 pcs.	MA30	3,000 pcs.
SA30	5,000 pcs.	MA40	3,000 pcs.
SA40	5,000 pcs.	MA50	950 pcs.
		MA60	650 pcs.

‡ 1000 pc. reels available for distribution pack only in ±1% and ±2% tolerance.

\*Standard Tape Spacing Shown. Also available in 26.0mm ± 1.5mm, - 0mm, (1.023 in. ± .059 in. - 0 in.) for SpinGuards only. EIA class I, II and III tape spacings are available for all axials.

## Additional Packaging Available

### AXIAL PACK

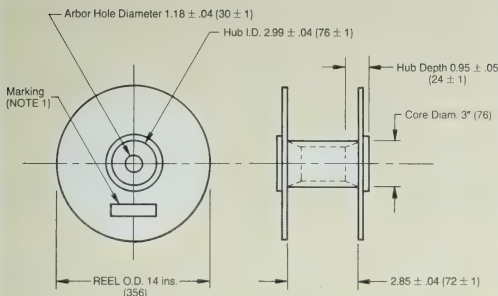
Tape Spacing	MA10, SA10 MA20, SA20	SA11 SA30	MA30, MA40, SA40	BOX SIZES (Nominal)		
				L	W	H
52.4mm ± 1.5mm (2.062" ± .059")	4,000 pcs.	3000	2,000 pcs.	255mm (10.039")	73mm (2.874")	93mm (3.661")
26.0mm ± 1.5mm - 0mm (1.023" ± .059" - 0")	4,000 pcs.*	3000	2,000 pcs.*	255mm (10.039")	48mm (1.889")	113mm (4.448")

\*SpinGuard only

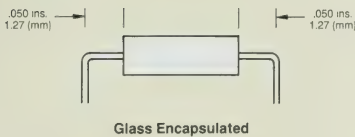
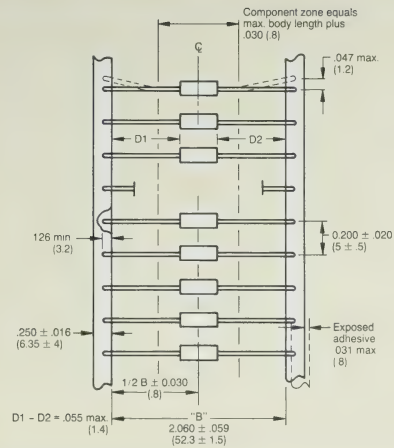
# MLC Capacitor

MA10 MA20 MA30 MA40	100 pcs (bag)
MA50 MA60	50 pcs. (bag)

## Glass Axial Leaded MLC Capacitors Packaging



NOTE 1: Customer Part Number, AVX Part Number, Customer P.O. Number, Quantity, Date Code



Glass Encapsulated

### GLASS ENCAPSULATED

Case Size	A	B	D	E	F
Quantity	8000	6000	6000	5000	4000

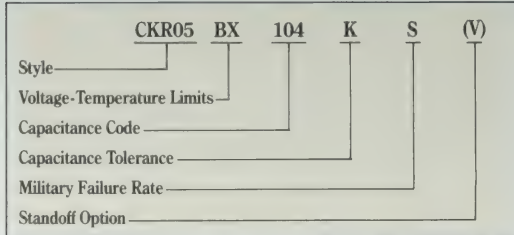
# MIL-C-39014/Radial Leads

## HOW TO ORDER

**Military Type Designation:** Styles CKR04, CKR05, CKR06, CKR08

**Dash Number Option:** MIL-C-39014/01 (Appropriate Dash Number)

**Part Number Example**



### MIL Part No. Codes

Style: CK = general purpose, ceramic dielectric, fixed capacitors.

R = Established Reliability parts.

05 = Remaining two numbers identify shape and dimension.

### Voltage-Temperature Limits:

First letter identifies temperature range. B = -55°C to +125°C

Second letter identifies voltage-temperature coefficient.

Capacitance Change with Reference to 25°C		
Second Letter	No Voltage	Rated Voltage
X	+15, -15%	+15, -25%

### Sig. Fig. Capacitance and Multiplier:

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R4 = 1.4 pF).

**Capacitance Tolerances:** K =  $\pm 10\%$ , M =  $\pm 20\%$

**Military Failure Rate:** M = 1% per 1000 hours; P = 0.1% per 1000 hours; R = 0.01% per 1000 hours; S = 0.001% per 1000 hours

Note: AVX reserves the right to substitute a lower failure rate part per MIL-C-39014. Substitutability for failure rate levels shall be as follows:

Failure Rate Level	Will Replace Failure Rate Level
S (STD) (X-ray)	R, P, M, L
R (STD) (No X-ray)	P, M, L
P	M, L
M	L

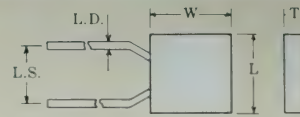


Figure 1

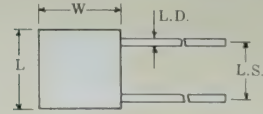


Figure 2

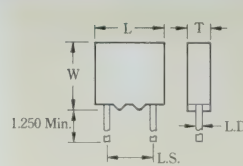


Figure 3

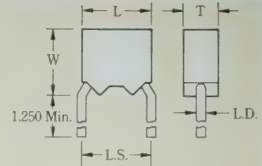


Figure 4

To order standoff option, place "V" at the end of the part number. For example: CKR05BX104KSV.

## PACKAGING REQUIREMENTS

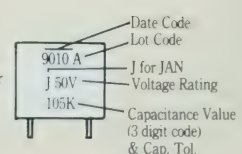
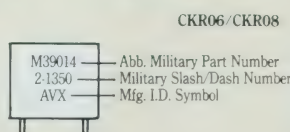
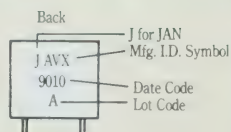
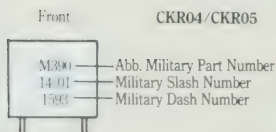
**Packaging:** 100 pcs/bag; Radial Tape and Reel Packaging available upon request.

## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Per Mil Spec	Case Size				
MIL-C-39014	Length (L)	Width (W)	Thickness (T)	Lead Spacing (L.S.)	Lead Diameter (L.D.)
CKR04 (Fig. 2)	4.38 $\pm$ .25 (.190 $\pm$ .010)	4.38 $\pm$ .25 (.190 $\pm$ .010)	2.29 $\pm$ .25 (.090 $\pm$ .010)	2.54 $\pm$ .38 (.100 $\pm$ .015)	.64 $\pm$ .05 (.025 $\pm$ .002)
CKR05 (Fig. 1, 4)	4.38 $\pm$ .25 (.190 $\pm$ .010)	4.38 $\pm$ .25 (.190 $\pm$ .010)	2.29 $\pm$ .25 (.090 $\pm$ .010)	5.08 $\pm$ .38 (.200 $\pm$ .015)	.64 $\pm$ .05 (.025 $\pm$ .002)
CKR06 (Fig. 2, 3)	7.37 $\pm$ .25 (.290 $\pm$ .010)	7.37 $\pm$ .25 (.290 $\pm$ .010)	2.29 $\pm$ .25 (.090 $\pm$ .010)	5.08 $\pm$ .38 (.200 $\pm$ .015)	.64 $\pm$ .05 (.025 $\pm$ .002)
CKR08 (Fig. 2)	7.37 $\pm$ .25 (.290 $\pm$ .010)	7.37 $\pm$ .25 (.290 $\pm$ .010)	3.68 $\pm$ .38 (.145 $\pm$ .015)	5.08 $\pm$ .38 (.200 $\pm$ .015)	.64 $\pm$ .05 (.025 $\pm$ .002)

## MARKING Radial Lead





# MILITARY DASH NUMBER IDENTIFICATION CKR04 to MIL-C-39014/23 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR04 (BX)						
CKR04BX100K	0001	0101	0201	0301	10	10	200
CKR04BX100M	0002	0102	0202	0302	10	20	200
CKR04BX120K	0003	0103	0203	0303	12	10	200
CKR04BX150K	0004	0104	0204	0304	15	10	200
CKR04BX150M	0005	0105	0205	0305	15	20	200
CKR04BX180M	0006	0106	0206	0306	18	10	200
CKR04BX220K	0007	0107	0207	0307	22	10	200
CKR04BX220M	0008	0108	0208	0308	22	20	200
CKR04BX270K	0009	0109	0209	0309	27	10	200
CKR04BX330K	0010	0110	0210	0310	33	10	200
CKR04BX330M	0011	0111	0211	0311	33	20	200
CKR04BX390K	0012	0112	0212	0312	39	10	200
CKR04BX470K	0013	0113	0213	0313	47	10	200
CKR04BX470M	0014	0114	0214	0314	47	20	200
CKR04BX560K	0015	0115	0215	0315	56	10	200
CKR04BX680K	0016	0116	0216	0316	68	10	200
CKR04BX680M	0017	0117	0217	0317	68	20	200
CKR04BX820K	0018	0118	0218	0318	82	10	200
CKR04BX101K	0019	0119	0219	0319	100	10	200
CKR04BX101M	0020	0120	0220	0320	100	20	200
CKR04BX121K	0021	0121	0221	0321	120	10	200
CKR04BX151K	0022	0122	0222	0322	150	10	200
CKR04BX151M	0023	0123	0223	0323	150	20	200
CKR04BX181K	0024	0124	0224	0324	180	10	200
CKR04BX221K	0025	0125	0225	0325	220	10	200
CKR04BX221M	0026	0126	0226	0326	220	20	200
CKR04BX271K	0027	0127	0227	0327	270	10	200
CKR04BX331K	0028	0128	0228	0328	330	10	200
CKR04BX331M	0029	0129	0229	0329	330	20	200
CKR04BX391K	0030	0130	0230	0330	390	10	200
CKR04BX471K	0031	0131	0231	0331	470	10	200
CKR04BX471M	0032	0132	0232	0332	470	20	200
CKR04BX561K	0033	0133	0233	0333	560	10	200
CKR04BX681K	0034	0134	0234	0334	680	10	200
CKR04BX681M	0035	0135	0235	0335	680	20	200
CKR04BX821K	0036	0136	0236	0336	820	10	200
CKR04BX102K	0037	0137	0237	0337	1,000	10	200
CKR04BX102M	0038	0138	0238	0338	1,000	20	200
CKR04BX122K	0039	0139	0239	0339	1,200	10	100
CKR04BX152K	0040	0140	0240	0340	1,500	10	100
CKR04BX152M	0041	0141	0241	0341	1,500	20	100
CKR04BX182K	0042	0142	0242	0342	1,800	10	100
CKR04BX222K	0043	0143	0243	0343	2,200	10	100
CKR04BX222M	0044	0144	0244	0344	2,200	20	100
CKR04BX272K	0045	0145	0245	0345	2,700	10	100
CKR04BX332K	0046	0146	0246	0346	3,300	10	100
CKR04BX332M	0047	0147	0247	0347	3,300	20	100
CKR04BX392K	0048	0148	0248	0348	3,900	10	100
CKR04BX472K	0049	0149	0249	0349	4,700	10	100
CKR04BX472M	0050	0150	0250	0350	4,700	20	100
CKR04BX562K	0051	0151	0251	0351	5,600	10	100
CKR04BX682K	0052	0152	0252	0352	6,800	10	100
CKR04BX682M	0053	0153	0253	0353	6,800	20	100
CKR04BX822K	0054	0154	0254	0354	8,200	10	100
CKR04BX103K	0055	0155	0255	0355	10,000	10	100
CKR04BX103M	0056	0156	0256	0356	10,000	20	100
CKR04BX123K	0057	0157	0257	0357	12,000	10	50
CKR04BX153K	0058	0158	0258	0358	15,000	10	50
CKR04BX153M	0059	0159	0259	0359	15,000	20	50
CKR04BX183K	0060	0160	0260	0360	18,000	10	50
CKR04BX223K	0061	0161	0261	0361	22,000	10	50
CKR04BX223M	0062	0162	0262	0362	22,000	20	50
CKR04BX273K	0063	0163	0263	0363	27,000	10	50
CKR04BX333K	0064	0164	0264	0364	33,000	10	50
CKR04BX333M	0065	0165	0265	0365	33,000	20	50
CKR04BX393K	0066	0166	0266	0366	39,000	10	50
CKR04BX473K	0067	0167	0267	0367	47,000	10	50
CKR04BX473M	0068	0168	0268	0368	47,000	20	50
CKR04BX563K	0069	0169	0269	0369	56,000	10	50
CKR04BX683K	0070	0170	0270	0370	68,000	10	50
CKR04BX683M	0071	0171	0271	0371	68,000	20	50
CKR04BX823K	0072	0172	0272	0372	82,000	10	50
CKR04BX104K	0073	0173	0273	0373	100,000	10	50
CKR04BX104M	0074	0174	0274	0374	100,000	20	50

— Add appropriate failure rate level letter (M, P, R or S)

# MIL-C-39014/Radial Leads

## MILITARY DASH NUMBER IDENTIFICATION CKR05 to MIL-C-39014/01 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR05 (BX)						
CKR05BX100K	1201	1241	1281	1321	10	10	200
CKR05BX100M	1202	1242	1282	1322	10	20	200
CKR05BX120K	1203	1243	1283	1323	12	10	200
CKR05BX150K	1204	1244	1284	1324	15	20	200
CKR05BX150M	1205	1245	1285	1325	15	20	200
CKR05BX180K	1206	1246	1286	1326	18	10	200
CKR05BX220K	1207	1247	1287	1327	22	10	200
CKR05BX220M	1208	1248	1288	1328	22	20	200
CKR05BX270K	1209	1249	1289	1329	27	10	200
CKR05BX330K	1210	1250	1290	1330	33	10	200
CKR05BX330M	1211	1251	1291	1331	33	20	200
CKR05BX390K	1212	1252	1292	1332	39	10	200
CKR05BX470K	1213	1253	1293	1333	47	10	200
CKR05BX470M	1214	1254	1294	1334	47	20	200
CKR05BX560K	1215	1255	1295	1335	56	10	200
CKR05BX680K	1216	1256	1296	1336	68	10	200
CKR05BX680M	1217	1257	1297	1337	68	20	200
CKR05BX820K	1218	1258	1298	1338	82	10	200
CKR05BX101K	1219	1259	1299	1339	100	10	200
CKR05BX101M	1220	1260	1300	1340	100	20	200
CKR05BX121K	1221	1261	1301	1341	120	10	200
CKR05BX151K	1222	1262	1302	1342	150	10	200
CKR05BX151M	1223	1263	1303	1343	150	20	200
CKR05BX181K	1224	1264	1304	1344	180	10	200
CKR05BX221K	1225	1265	1305	1345	220	10	200
CKR05BX221M	1226	1266	1306	1346	220	20	200
CKR05BX271K	1227	1267	1307	1347	270	10	200
CKR05BX331K	1228	1268	1308	1348	330	10	200
CKR05BX331M	1229	1269	1309	1349	330	20	200
CKR05BX391K	1230	1270	1310	1350	390	10	200
CKR05BX471K	1231	1271	1311	1351	470	10	200
CKR05BX471M	1232	1272	1312	1352	470	20	200
CKR05BX561K	1233	1273	1313	1353	560	10	200
CKR05BX681K	1234	1274	1314	1354	680	10	200
CKR05BX681M	1235	1275	1315	1355	680	20	200
CKR05BX821K	1236	1276	1316	1356	820	10	200
CKR05BX102K	1237	1277	1317	1357	1,000	10	200
CKR05BX102M	1238	1278	1318	1358	1,000	20	200
CKR05BX122K	1239	1279	1319	1359	1,200	10	100
CKR05BX152K	1240	1280	1320	1360	1,500	10	100
CKR05BX152M	1441	1481	1521	1561	1,500	20	100
CKR05BX182K	1442	1482	1522	1562	1,800	10	100
CKR05BX222K	1443	1483	1523	1563	2,200	10	100
CKR05BX222M	1444	1484	1524	1564	2,200	20	100
CKR05BX272K	1445	1485	1525	1565	2,700	10	100
CKR05BX332K	1446	1486	1526	1566	3,300	10	100
CKR05BX332M	1447	1487	1527	1567	3,300	20	100
CKR05BX392K	1448	1488	1528	1568	3,900	10	100
CKR05BX472K	1449	1489	1529	1569	4,700	10	100
CKR05BX472M	1450	1490	1530	1570	4,700	20	100
CKR05BX562K	1451	1491	1531	1571	5,600	10	100
CKR05BX682K	1452	1492	1532	1572	6,800	10	100
CKR05BX682M	1453	1493	1533	1573	6,800	20	100
CKR05BX822K	1454	1494	1534	1574	8,200	10	100
CKR05BX103K	1455	1495	1535	1575	10,000	10	100
CKR05BX103M	1456	1496	1536	1576	10,000	20	100
CKR05BX123K	1457	1497	1537	1577	12,000	10	50
CKR05BX153K	1458	1498	1538	1578	15,000	10	50
CKR05BX153M	1459	1499	1539	1579	15,000	20	50
CKR05BX183K	1460	1500	1540	1580	18,000	10	50
CKR05BX223K	1461	1501	1541	1581	22,000	10	50
CKR05BX223M	1462	1502	1542	1582	22,000	20	50
CKR05BX273K	1463	1503	1543	1583	27,000	10	50
CKR05BX333K	1464	1504	1544	1584	33,000	10	50
CKR05BX333M	1465	1505	1545	1585	33,000	20	50
CKR05BX393K	1466	1506	1546	1586	39,000	10	50
CKR05BX473K	1467	1507	1547	1587	47,000	10	50
CKR05BX473M	1468	1508	1548	1588	47,000	20	50
CKR05BX563K	1469	1509	1549	1589	56,000	10	50
CKR05BX683K	1470	1510	1550	1590	68,000	10	50
CKR05BX683M	1471	1511	1551	1591	68,000	20	50
CKR05BX823K	1472	1512	1552	1592	82,000	10	50
CKR05BX104K	1473	1513	1553	1593	100,000	10	50
CKR05BX104M	1474	1514	1554	1594	100,000	20	50

Add appropriate failure rate level (M, P, R, or S).

# MILITARY DASH NUMBER IDENTIFICATION CKR06 to MIL-C-39014/02 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR06 (BX)						
CKR06BX122K	1201	1241	1281	1321	1200	10	200
CKR06BX152K	1202	1242	1282	1322	1500	10	200
CKR06BX152M	1203	1243	1283	1323	1500	20	200
CKR06BX182K	1204	1244	1284	1324	1800	10	200
CKR06BX222K	1206	1246	1286	1326	2200	10	200
CKR06BX222M	1207	1247	1287	1327	2200	20	200
CKR06BX272K	1208	1248	1288	1328	2700	10	200
CKR06BX332K	1209	1249	1289	1329	3300	10	200
CKR06BX332M	1210	1250	1290	1330	3300	20	200
CKR06BX392K	1211	1251	1291	1331	3900	10	200
CKR06BX472K	1212	1252	1292	1332	4700	10	200
CKR06BX472M	1213	1253	1293	1333	4700	20	200
CKR06BX562K	1214	1254	1294	1334	5600	10	200
CKR06BX682K	1215	1255	1295	1335	6800	10	200
CKR06BX682M	1216	1256	1296	1336	6800	20	200
CKR06BX822K	1217	1257	1297	1337	8200	10	200
CKR06BX103K	1218	1258	1298	1338	10,000	10	200
CKR06BX103M	1219	1259	1299	1339	10,000	20	200
CKR06BX123K	1231	1271	1311	1351	12,000	10	100
CKR06BX153K	1220	1260	1300	1340	15,000	10	100
CKR06BX183K	1221	1261	1301	1341	18,000	10	100
CKR06BX223K	1222	1262	1302	1342	22,000	10	100
CKR06BX273K	1232	1272	1312	1352	27,000	10	100
CKR06BX333K	1223	1263	1303	1343	33,000	10	100
CKR06BX393K	1224	1264	1304	1344	39,000	10	100
CKR06BX473K	1225	1265	1305	1345	47,000	10	100
CKR06BX563K	1226	1266	1306	1346	56,000	10	100
CKR06BX683K	1227	1267	1307	1347	68,000	10	100
CKR06BX823K	1229	1269	1309	1349	82,000	10	100
CKR06BX104K	1230	1270	1310	1350	100,000	10	100
CKR06BX124K	1233	1273	1313	1353	120,000	10	50
CKR06BX154K	1234	1274	1314	1354	150,000	10	50
CKR06BX184K	1235	1275	1315	1355	180,000	10	50
CKR06BX224K	1236	1276	1316	1356	220,000	10	50
CKR06BX274K	1237	1277	1317	1357	270,000	10	50
CKR06BX334K	1238	1278	1318	1358	330,000	10	50
CKR06BX394K	1239	1279	1319	1359	390,000	10	50
CKR06BX474K	1240	1280	1320	1360	470,000	10	50
CKR06BX564K	1404	1408	1412	1416	560,000	10	50
CKR06BX684K	1405	1409	1413	1417	680,000	10	50
CKR06BX824K	1406	1410	1414	1418	820,000	10	50
CKR06BX105K	1407	1411	1415	1419	1,000,000	10	50

— Add appropriate failure rate level letter (M, P, R, or S)

## CKR08 to MIL-C-39014/20 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR08 (BX)						
CKR08BX125K	0104	0107	0110	0113	1,200,000	10	50
CKR08BX155K	0105	0108	0111	0114	1,500,000	10	50
CKR08BX205K	0106	0109	0112	0115	2,000,000	10	50

— Add appropriate failure rate level letter (M, P, R or S)

## CROSS REFERENCE CHART - AVX MILITARY FOR MOLDED RADIAL LEAD

Dimensions: Millimeters (Inches)

Figure	AVX Style	Per Mil-Spec			Case Size				
		MIL-C-11015	MIL-C-39014	MIL-C-20	Length(L)	Width (W)	Lead Thickness (T)	Lead Spacing (LS)	Diameter (LD)
1	MR05	CK05	CKR05	CCR05/CC05	4.83±.25 (.190±.010)	4.83±.25 (.190±.010)	2.29±.25 (.090±.010)	5.08±.38 (.200±.015)	.64±.05 (.025±.002)
2	MR04	—	CKR04	CCR09/CC09	4.83±.25 (.190±.010)	4.83±.25 (.190±.010)	2.29±.25 (.090±.010)	2.54±.38 (.100±.015)	.64±.05 (.025±.002)
2	MR06	CK06	CKR06	CCR06/CC06	7.37±.25 (.290±.010)	7.37±.25 (.290±.010)	2.29±.25 (.090±.010)	5.08±.38 (.200±.015)	.64±.05 (.025±.002)
2	CR08	—	CKR08	—	7.37±.25 (.290±.010)	7.37±.25 (.290±.010)	3.68±.38 (.145±.015)	5.08±.38 (.200±.015)	.64±.05 (.025±.002)
2	MR07	—	—	CCR07/CC07	12.19±.51 (.480±.020)	12.19±.51 (.480±.020)	3.56±.25 (.140±.010)	10.16±.51 (.400±.020)	.64±.05 (.025±.002)
2	MR08	—	—	CCR08/CC08	12.19±.51 (.480±.020)	12.19±.51 (.480±.020)	6.1±.25 (.240±.010)	10.16±.51 (.400±.020)	.64±.05 (.025±.002)



# MIL-C-39014/Axial Leads

## MIL-C-39014/Axial Lead

### HOW TO ORDER

**Military Type Designation:** Styles CKR11, CKR12, CKR14, CKR15, CKR16

**Dash Number Option**

MIL-C-39014/05 (Add appropriate dash number)

**Part Number Example**

	CKR11	BX	103	K	S
Style _____					
Voltage-Temperature Limits _____					
Capacitance Code _____					
Capacitance Tolerance _____					
Military Failure Rate _____					

**MIL Part No. Codes**

Style: CK = general purpose, ceramic dielectric, fixed capacitors.  
 R = Established Reliability parts.  
 11 = Remaining two numbers identify shape and dimension.

**Voltage-Temperature Limits:**

First letter identifies temperature range.  
 B = -55°C to +125°C

Second letter identifies voltage-temperature coefficient.

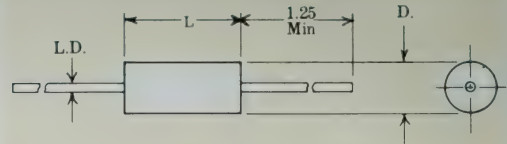
Capacitance Change with Reference to 25°C		
Second Letter	No Voltage	Rated Voltage
R	+15, -15%	+15, -40%
X	+15, -15%	+15, -25%

**Sig. Fig. Capacitance and Multiplier:**

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 10,000 pF as 103.

**Capacitance Tolerances:** K = ±10%, M = ±20%

**Military Failure Rate:** M = 1% per 1000 hours  
 P = 0.1% per 1000 hours  
 R = 0.01% per 1000 hours  
 S = 0.001% per 1000 hours



Note: AVX reserves the right to substitute a lower failure rate part per MIL-C-39014/5E. Substitutability for failure rate levels shall be as follows:

Failure Rate Level	Will Replace Failure Rate Level
S (STD) (X-ray)	R, P, M, L
R (STD) (No X-ray)	P, M, L
P	M, L
M	L

### PACKAGING REQUIREMENTS

**Packaging:** 50 pcs/bag

### SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Per Mil Spec	Case Size		
MIL-C-39014	Length (L)	Diameter (D)	Lead Diameter (L.D.)
CKR11	4.07±.25 (.160±.010)	2.29±.25 (.090±.010)	.48±.05 (.019±.002)
CKR12	6.35±.25 (.250±.010)	2.29±.25 (.090±.010)	.48±.25 (.019±.002)
CKR14	9.91±.25 (.390±.010)	3.36±.25 (.140±.010)	.63±.25 (.025±.002)
CKR15	12.7±.51 (.500±.020)	6.35±.38 (.250±.015)	.63±.05 (.025±.002)
CKR16	17.53±.51 (.690±.020)	8.89±.51 (.350±.010)	.63±.05 (.025±.002)

# MILITARY DASH NUMBER IDENTIFICATION CKR11 to MIL-C-39014/05 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR11 (BX)						
CKR11BX100K	2601	2801	2001	2201	10	10	100
CKR11BX100M	2602	2802	2002	2202	10	20	100
CKR11BX120K	2603	2803	2003	2203	12	10	100
CKR11BX150K	2604	2804	2004	2204	15	10	100
CKR11BX150M	2605	2805	2005	2205	15	20	100
CKR11BX180K	2606	2806	2006	2206	18	10	100
CKR11BX220K	2607	2807	2007	2207	22	10	100
CKR11BX220M	2608	2808	2008	2208	22	20	100
CKR11BX270K	2609	2809	2009	2209	27	10	100
CKR11BX330K	2610	2810	2010	2210	33	10	100
CKR11BX330M	2611	2811	2011	2211	33	20	100
CKR11BX390K	2612	2812	2012	2212	39	10	100
CKR11BX470K	2613	2813	2013	2213	47	10	100
CKR11BX470M	2614	2814	2014	2214	47	20	100
CKR11BX560K	2615	2815	2015	2215	56	10	100
CKR11BX680K	2616	2816	2016	2216	68	10	100
CKR11BX680M	2617	2817	2017	2217	68	20	100
CKR11BX820K	2618	2818	2018	2218	82	10	100
CKR11BX101K	2619	2819	2019	2219	100	10	100
CKR11BX101M	2620	2820	2020	2220	100	20	100
CKR11BX121K	2621	2821	2021	2221	120	10	100
CKR11BX151K	2622	2822	2022	2222	150	10	100
CKR11BX151M	2623	2823	2023	2223	150	20	100
CKR11BX181K	2624	2824	2024	2224	180	10	100
CKR11BX221K	2625	2825	2025	2225	220	10	100
CKR11BX221M	2626	2826	2026	2226	220	20	100
CKR11BX271K	2627	2827	2027	2227	270	10	100
CKR11BX331K	2628	2828	2028	2228	330	10	100
CKR11BX331M	2629	2829	2029	2229	330	20	100
CKR11BX391K	2630	2830	2030	2230	390	10	100
CKR11BX471K	2631	2831	2031	2231	470	10	100
CKR11BX471M	2632	2832	2032	2232	470	20	100
CKR11BX561K	2633	2833	2033	2233	560	10	100
CKR11BX681K	2634	2834	2034	2234	680	10	100
CKR11BX681M	2635	2835	2035	2235	680	20	100
CKR11BX821K	2636	2836	2036	2236	820	10	100
CKR11BX102K	2637	2837	2037	2237	1000	10	100
CKR11BX102M	2638	2838	2038	2238	1000	20	100
CKR11BX122K	2639	2839	2039	2239	1200	10	100
CKR11BX152K	2640	2840	2040	2240	1500	10	100
CKR11BX152M	2641	2841	2041	2241	1500	20	100
CKR11BX182K	2642	2842	2042	2242	1800	10	100
CKR11BX222K	2643	2843	2043	2243	2200	10	100
CKR11BX222M	2644	2844	2044	2244	2200	20	100
CKR11BX272K	2645	2845	2045	2245	2700	10	100
CKR11BX332K	2646	2846	2046	2246	3300	10	100
CKR11BX332M	2647	2847	2047	2247	3300	20	100
CKR11BX392K	2648	2848	2048	2248	3900	10	100
CKR11BX472K	2649	2849	2049	2249	4700	10	100
CKR11BX472M	2650	2850	2050	2250	4700	20	100
CKR11BX562K	2651	2851	2051	2251	5600	10	50
CKR11BX682K	2652	2852	2052	2252	6800	10	50
CKR11BX682M	2653	2853	2053	2253	6800	20	50
CKR11BX822K	2654	2854	2054	2254	8200	10	50
CKR11BX103K	2655	2855	2055	2255	10,000	10	50
CKR11BX103M	2656	2856	2056	2256	10,000	20	50

— Add appropriate failure rate level (M, P, R, or S)

# MIL-C-39014/Axial Leads

MILITARY DASH NUMBER IDENTIFICATION CKR12/14/15 to MIL-C-39014/05 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR12 (BX)						
CKR12BX562K	2657	2857	2057	2257	5600	10	100
CKR12BX682K	2658	2858	2058	2258	6800	10	100
CKR12BX682M	2659	2859	2059	2259	6800	20	100
CKR12BX822K	2660	2860	2060	2260	8200	10	100
CKR12BX103K	2661	2861	2061	2261	10,000	10	100
CKR12BX103M	2662	2862	2062	2262	10,000	20	100
CKR12BX123K	2663	2863	2063	2263	12,000	10	50
CKR12BX153K	2664	2864	2064	2264	15,000	10	50
CKR12BX153M	2665	2865	2065	2265	15,000	20	50
CKR12BX183K	2666	2866	2066	2266	18,000	10	50
CKR12BX223K	2667	2867	2067	2267	22,000	10	50
CKR12BX223M	2668	2868	2068	2268	22,000	20	50
CKR12BX273K	2669	2869	2069	2269	27,000	10	50
CKR12BX333K	2670	2870	2070	2270	33,000	10	50
CKR12BX333M	2671	2871	2071	2271	33,000	20	50
CKR12BX393K	2672	2872	2072	2272	39,000	10	50
CKR12BX473K	2673	2873	2073	2273	47,000	10	50
CKR12BX473M	2674	2874	2074	2274	47,000	20	50
	CKR14 (BX)						
CKR14BX123K	2675	2875	2075	2275	12,000	10	100
CKR14BX153K	2676	2876	2076	2276	15,000	10	100
CKR14BX153M	2677	2877	2077	2277	15,000	20	100
CKR14BX183K	2678	2878	2078	2278	18,000	10	100
CKR14BX223K	2679	2879	2079	2279	22,000	10	100
CKR14BX223M	2680	2880	2080	2280	22,000	20	100
CKR14BX273K	2681	2881	2081	2281	27,000	10	100
CKR14BX333K	2682	2882	2082	2282	33,000	10	100
CKR14BX333M	2683	2883	2083	2283	33,000	20	100
CKR14BX393K	2684	2884	2084	2284	39,000	10	100
CKR14BX473K	2685	2885	2085	2285	47,000	10	100
CKR14BX473M	2686	2886	2086	2286	47,000	20	100
CKR14BX563K	2687	2887	2087	2287	56,000	10	50
CKR14BX683K	2688	2888	2088	2288	68,000	10	50
CKR14BX683M	2689	2889	2089	2289	68,000	20	50
CKR14BX823K	2690	2890	2090	2290	82,000	10	50
CKR14BX104K	2691	2891	2091	2291	100,000	10	50
CKR14BX104M	2692	2892	2092	2292	100,000	20	50
	CKR14 (BR)						
CKR14BR563K	2693	2893	2093	2293	56,000	10	100
CKR14BR683K	2694	2894	2094	2294	68,000	10	100
CKR14BR683M	2695	2895	2095	2295	68,000	20	100
CKR14BR823K	2696	2896	2096	2296	82,000	10	100
CKR14BR104K	2697	2897	2097	2297	100,000	10	100
CKR14BR104M	2698	2898	2098	2298	100,000	20	100
CKR14BR124K	2699	2899	2099	2299	120,000	10	50
CKR14BR154K	2700	2900	2100	2300	150,000	10	50
CKR14BR154M	2701	2901	2101	2301	150,000	20	50
CKR14BR184K	2702	2902	2102	2302	180,000	10	50
CKR14BR224K	2703	2903	2103	2303	220,000	10	50
CKR14BR224M	2704	2904	2104	2304	220,000	20	50
CKR14BR274K	2705	2905	2105	2305	270,000	10	50
	CKR15 (BX)						
CKR15BX563K	2706	2906	2106	2306	56,000	10	100
CKR15BX683K	2707	2907	2107	2307	68,000	10	100
CKR15BX683M	2708	2908	2108	2308	68,000	20	100
CKR15BX823K	2709	2909	2109	2309	82,000	10	100
CKR15BX104K	2710	2910	2110	2310	100,000	10	100
CKR15BX104M	2711	2911	2111	2311	100,000	20	100

\_\_\_\_\_ Add appropriate failure rate level (M, P, R, or S).



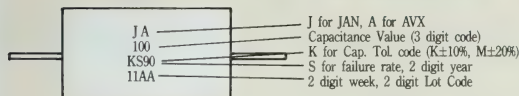
## MILITARY DASH NUMBER IDENTIFICATION CKR15/16 to MIL-C-39014/05 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	CKR15 (BR)						
CKR15BR124K_	2712	2912	2112	2312	120,000	10	100
CKR15BR154K_	2713	2913	2113	2313	150,000	10	100
CKR15BR154M_	2714	2914	2114	2314	150,000	20	100
CKR15BR184K_	2715	2915	2115	2315	180,000	10	100
CKR15BR224K_	2716	2916	2116	2316	220,000	10	100
CKR15BR224M_	2717	2917	2117	2317	220,000	20	100
CKR15BR274K_	2718	2918	2118	2318	270,000	10	100
CKR15BR334K_	2719	2919	2119	2319	330,000	10	100
CKR15BR334M_	2720	2920	2120	2320	330,000	20	100
CKR15BR474K_	2721	2921	2121	2321	470,000	10	50
CKR15BR474M_	2722	2922	2122	2322	470,000	20	50
CKR15BR684K_	2723	2923	2123	2323	680,000	10	50
CKR15BR684M_	2724	2924	2124	2324	680,000	20	50
CKR15BR105K_	2725	2925	2125	2325	1,000,000	10	50
CKR15BR105M_	2726	2926	2126	2326	1,000,000	20	50
	CKR16 (BR)						
CKR16BR474K_	2727	2927	2127	2327	470,000	10	100
CKR16BR474M_	2728	2928	2128	2328	470,000	20	100
CKR16BR684K_	2729	2929	2129	2329	680,000	10	100
CKR16BR684M_	2730	2930	2130	2330	680,000	20	100
CKR16BR105K_	2731	2931	2131	2331	1,000,000	10	100
CKR16BR105M_	2732	2932	2132	2332	1,000,000	20	100
CKR16BR225K_	2733	2933	2133	2333	2,200,000	10	50
CKR16BR225M_	2734	2934	2134	2334	2,200,000	20	50
CKR16BR335K_	2735	2935	2135	2335	3,300,000	10	50
CKR16BR335M_	2736	2936	2136	2336	3,300,000	20	50

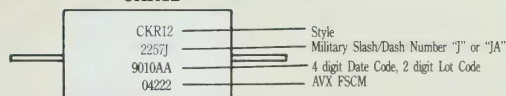
— Add appropriate failure rate level (M, P, R or S).

## MARKING

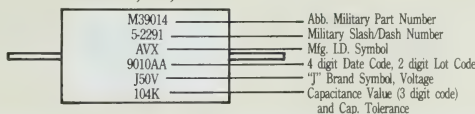
### CKR11



### CKR12



### CKR14, 15, 16



## CROSS REFERENCE CHART - AVX MILITARY FOR MOLDED AXIAL LEAD

Dimensions: Millimeters (Inches)

AVX Style	Per Mil-Spec			Case Size		
	MIL-C-11015	MIL-C-39014	MIL-C-20	Length (L)	Diameter (D)	Lead Diameter (LD)
MA10	CK12	CKR11	CCR75/CC75	4.07 ±.25 (.160 ±.010)	2.29 ±.25 (.090 ±.010)	.48 ±.05 (.019 ±.002)
MA20	CK13	CKR12	CCR76/CC76	6.35 ±.25 (.250 ±.010)	2.29 ±.25 (.090 ±.010)	.48 ±.05 (.019 ±.002)
MA30	—	—	—	6.10 ±.25 (.240 ±.010)	3.30 ±.25 (.130 ±.010)	.48 ±.05 (.019 ±.002)
MA40	CK14	CKR14	CCR77/CC77	9.91 ±.25 (.390 ±.010)	3.36 ±.25 (.140 ±.010)	.63 ±.05 (.025 ±.002)
MA50	CK15	CKR15	CCR78/CC78	12.7 ±.51 (.500 ±.020)	6.35 ±.38 (.250 ±.015)	.63 ±.05 (.025 ±.002)
MA60	CK16	CKR16	CCR79/CC79	17.53 ±.51 (.690 ±.020)	8.89 ±.51 (.350 ±.015)	.63 ±.05 (.025 ±.002)

# MIL-C-39014/2 Pin DIP

## HOW TO ORDER

**Military Type Designation:** Styles CKR22, CKR23, CKR24

**Dash Number Option**

MIL-C-39014/22 (Appropriate Dash Number)

**Part No. Example**

	CKR22	BX	104	K	R
Style					
Voltage-Temperature Limits					
Capacitance Code					
Capacitance Tolerance					
Military Failure Rate					

## MIL Part No. Codes

Style: CK = general purpose, ceramic dielectric, fixed capacitors.

R = Established Reliability parts.

22 = Remaining two numbers identify shape and dimension.

## Voltage-Temperature Limits:

First letter identifies temperature range.

B = -55°C to +125°C

C = -55°C to +150°C

Send letter identifies voltage-temperature coefficient.

## Capacitance Change with Reference to 25°C

Second Letter	No Voltage	Rated Voltage
G	+30,-30ppm	+30,-30ppm
H	+60,-60ppm	+60,-60ppm
R	+15, -15%	+15, -40%
X	+15, -15%	+15, -25%

## Sig. Fig. Capacitance and Multiplier:

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R5 = 1.5 pF).

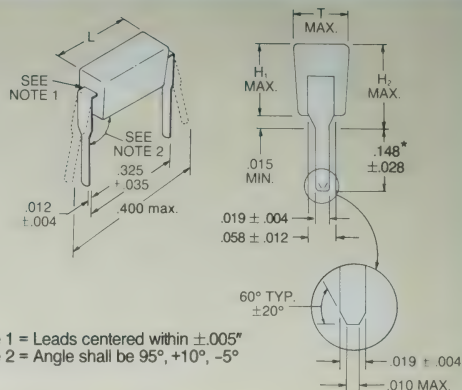
**Capacitance Tolerances:** D =  $\pm 5\text{pF}$ , F =  $\pm 1\%$ , J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$

**Military Failure Rate:** M = 1% per 1000 hours

P = 0.1% per 1000 hours

R = 0.01% per 1000 hours

S = 0.001% per 1000 hours



\*Special lead length of 0.150" min. are available, consult factory for details.

Note: AVX reserves the right to substitute a lower failure rate part per MIL-C-39014. Substitutability for failure rate levels shall be as follows:

Failure Rate Level	Will Replace Failure Rate Level
S (STD) (X-ray)	R, P, M, L
R (STD) (No X-ray)	P, M, L
P	M, L
M	L

## PACKAGING REQUIREMENTS

Packaging: 200 pcs/slide pack. See page 26.

## SIZE SPECIFICATIONS

MIL-C-39014	Length (L)	Height (H <sub>1</sub> )	Height (H <sub>2</sub> )	Thickness
CKR22	260 $\pm$ 020 (6.60)	128 $\pm$ 007 (3.25)	175 max. (4.45)	0.092 $\pm$ 006 (2.34)
CKR23	260 $\pm$ 020 (6.60)	155 $\pm$ 007 (3.94)	195 max. (4.95)	0.092 $\pm$ 006 (2.34)
CKR24	260 $\pm$ 020 (6.60)	283 $\pm$ 007 (7.19)	320 max. (8.13)	0.092 $\pm$ 006 (2.34)

Dimensions: Inches (Millimeters)

# MILITARY DASH NUMBER IDENTIFICATION CKR22 to MIL-C-39014/22 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	Style CKR22, voltage-temperature limits of 0±60 ppm/°C.						
CKR22CH1R0D_	0001	0301	0601	0901	1.0	D	200
CKR22CH1R2D_	0004	0304	0604	0904	1.2	D	
CKR22CH1R5D_	0007	0307	0607	0907	1.5	D	
CKR22CH1R8D_	0010	0310	0610	0910	1.8	D	
CKR22CH2R2D_	0013	0313	0613	0913	2.2	D	
CKR22CH2R7D_	0016	0316	0616	0916	2.7	D	
CKR22CH3R3D_	0019	0319	0619	0919	3.3	D	
CKR22CH3R9D_	0022	0322	0622	0922	3.9	D	
CKR22CH4R7D_	0025	0325	0625	0925	4.7	D	
CKR22CH5R6D_	0028	0328	0628	0928	5.6	D	
CKR22CH6R8D_	0031	0331	0631	0931	6.8	D	200
CKR22CH8R2D_	0034	0334	0634	0934	8.2	D	
CKR22CH100D_	0037	0337	0637	0937	10	D	
CKR22CH100J_	0038	0338	0638	0938	10	J	
CKR22CH100K_	0039	0339	0639	0939	10	K	
CKR22CH120D_	0040	0340	0640	0940	12	D	
CKR22CH120J_	0041	0341	0641	0941	12	J	
CKR22CH120K_	0042	0342	0642	0942	12	K	
CKR22CH150D_	0043	0343	0643	0943	15	D	
CKR22CH150J_	0044	0344	0644	0944	15	J	
CKR22CH150K_	0045	0345	0645	0945	15	K	200
CKR22CH180D_	0046	0346	0646	0946	18	D	
CKR22CH180J_	0047	0347	0647	0947	18	J	
CKR22CH180K_	0048	0348	0648	0948	18	K	
	Style CKR22, voltage-temperature limits of 0±30 ppm/°C.						
CKR22CG220D_	0049	0349	0649	0949	22	D	200
CKR22CG220J_	0050	0350	0650	0950	22	J	
CKR22CG220K_	0051	0351	0651	0951	22	K	
CKR22CG270D_	0052	0352	0652	0952	27	D	
CKR22CG270J_	0053	0353	0653	0953	27	J	
CKR22CG270K_	0054	0354	0654	0954	27	K	
CKR22CG330D_	0055	0355	0655	0955	33	D	
CKR22CG330J_	0056	0356	0656	0956	33	J	
CKR22CG330K_	0057	0357	0657	0957	33	K	
CKR22CG390D_	0058	0358	0658	0958	39	D	
CKR22CG390J_	0059	0359	0659	0959	39	J	200
CKR22CG390K_	0060	0360	0660	0960	39	K	
CKR22CG470D_	0061	0361	0661	0961	47	D	
CKR22CG470J_	0062	0362	0662	0962	47	J	
CKR22CG470K_	0063	0363	0663	0963	47	K	
CKR22CG560D_	0064	0364	0664	0964	56	D	
CKR22CG560J_	0065	0365	0665	0965	56	J	
CKR22CG560K_	0066	0366	0666	0966	56	K	
CKR22CG680F_	0067	0367	0667	0967	68	F	
CKR22CG680J_	0068	0368	0668	0968	68	J	
CKR22CG680K_	0069	0369	0669	0969	68	K	200
CKR22CG820F_	0070	0370	0670	0970	82	F	
CKR22CG820J_	0071	0371	0671	0971	82	J	
CKR22CG820K_	0072	0372	0672	0972	82	K	
CKR22CG101F_	0073	0373	0673	0973	100	F	
CKR22CG101J_	0074	0374	0674	0974	100	J	
CKR22CG101K_	0075	0375	0675	0975	100	K	
CKR22CG121F_	0076	0376	0676	0976	120	F	
CKR22CG121J_	0077	0377	0677	0977	120	J	
CKR22CG121K_	0078	0378	0678	0978	120	K	
CKR22CG151F_	0079	0379	0679	0979	150	F	200
CKR22CG151J_	0080	0380	0680	0980	150	J	
CKR22CG151K_	0081	0381	0681	0981	150	K	
CKR22CG181F_	0082	0382	0682	0982	180	F	
CKR22CG181J_	0083	0383	0683	0983	180	J	
CKR22CG181K_	0084	0384	0684	0984	180	K	
CKR22CG221F_	0085	0385	0685	0985	220	F	
CKR22CG221J_	0086	0386	0686	0986	220	J	
CKR22CG221K_	0087	0387	0687	0987	220	K	
CKR22CG271F_	0088	0388	0688	0988	270	F	
CKR22CG271J_	0089	0389	0689	0989	270	J	

— Add appropriate failure rate level (M, P, R, or S).



# MIL-C-39014/2 Pin DIP

## MILITARY DASH NUMBER IDENTIFICATION CKR22 to MIL-C-39014/22 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	Style CKR22, Voltage-temperature limits of ±30 ppm/°C (continued)						
CKR22CG271K	0090	0390	0690	0990	270	K	200
CKR22CG331F	0091	0391	0691	0991	330	F	
CKR22CG331J	0092	0392	0692	0992	330	J	
CKR22CG331K	0093	0393	0693	0993	330	K	
CKR22CG391F	0094	0394	0694	0994	390	F	
CKR22CG391J	0095	0395	0695	0995	390	J	
CKR22CG391K	0096	0396	0696	0996	390	K	
CKR22CG471F	0097	0397	0697	0997	470	F	
CKR22CG471J	0098	0398	0698	0998	470	J	
CKR22CG471K	0099	0399	0699	0999	470	K	200
CKR22CG561F	0100	0400	0700	1000	560	F	100
CKR22CG561J	0101	0401	0701	1001	560	J	
CKR22CG561K	0102	0402	0702	1002	560	K	
CKR22CG681F	0103	0403	0703	1003	680	F	
CKR22CG681J	0104	0404	0704	1004	680	J	
CKR22CG681K	0105	0405	0705	1005	680	K	
CKR22CG821F	0106	0406	0706	1006	820	F	
CKR22CG821J	0107	0407	0707	1007	820	J	
CKR22CG821K	0108	0408	0708	1008	820	K	
CKR22CG102F	0109	0409	0709	1009	1000	F	
CKR22CG102J	0110	0410	0710	1010	1000	J	
CKR22CG102K	0111	0411	0711	1011	1000	K	
CKR22CG122F	0112	0412	0712	1012	1200	F	
CKR22CG122J	0113	0413	0713	1013	1200	J	
CKR22CG122K	0114	0414	0714	1014	1200	K	
CKR22CG152F	0115	0415	0715	1015	1500	F	
CKR22CG152J	0116	0416	0716	1016	1500	J	
CKR22CG152K	0117	0417	0717	1017	1500	K	
CKR22CG182F	0118	0418	0718	1018	1800	F	
CKR22CG182J	0119	0419	0719	1019	1800	J	
CKR22CG182K	0120	0420	0720	1020	1800	K	
CKR22CG222F	0121	0421	0721	1021	2200	F	
CKR22CG222J	0122	0422	0722	1022	2200	J	
CKR22CG222K	0123	0423	0723	1023	2200	K	
CKR22CG272F	0124	0424	0724	1024	2700	F	100
CKR22CG272J	0125	0425	0725	1025	2700	J	50
CKR22CG272K	0126	0426	0726	1026	2700	K	
CKR22CG332F	0127	0427	0727	1027	3300	F	
CKR22CG332J	0128	0428	0728	1028	3300	J	
CKR22CG332K	0129	0429	0729	1029	3300	K	
CKR22CG392F	0130	0430	0730	1030	3900	F	
CKR22CG392J	0131	0431	0731	1031	3900	J	
CKR22CG392K	0132	0432	0732	1032	3900	K	
CKR22CG472F	0133	0433	0733	1033	4700	F	
CKR22CG472J	0134	0434	0734	1034	4700	J	
CKR22CG472K	0135	0435	0735	1035	4700	K	
CKR22CG562F	0136	0436	0736	1036	5600	F	
CKR22CG562J	0137	0437	0737	1037	5600	J	
CKR22CG562K	0138	0438	0738	1038	5600	K	
CKR22CG682F	0139	0439	0739	1039	6800	F	
CKR22CG682J	0140	0440	0740	1040	6800	J	
CKR22CG682K	0141	0441	0741	1041	6800	K	
CKR22CG822F	0142	0442	0742	1042	8200	F	
CKR22CG822J	0143	0443	0743	1043	8200	J	
CKR22CG822K	0144	0444	0744	1044	8200	K	
CKR22CG103F	0145	0445	0745	1045	10,000	F	
CKR22CG103J	0146	0446	0746	1046	10,000	J	
CKR22CG103K	0147	0447	0747	1047	10,000	K	50

— Add appropriate failure rate level (M, P, R, or S).

# MILITARY DASH NUMBER IDENTIFICATION CKR22 to MIL-C-39014/22 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	Style CKR22, Voltage-temperature limits of ±15% (+15%, -25% for Rated Voltage)						
CKR22BX271K	0148	0448	0748	1048	270	K	200
CKR22BX331K	0149	0449	0749	1049	330	K	
CKR22BX331M	0150	0450	0750	1050	330	M	
CKR22BX391K	0151	0451	0751	1051	390	K	
CKR22BX471K	0152	0452	0752	1052	470	K	200
CKR22BX471M	0153	0453	0753	1053	470	M	
CKR22BX561K	0154	0454	0754	1054	560	K	
CKR22BX681K	0155	0455	0755	1055	680	K	
CKR22BX681M	0156	0456	0756	1056	680	M	100
CKR22BX821K	0157	0457	0757	1057	820	K	
CKR22BX102K	0158	0458	0758	1058	1,000	K	
CKR22BX102M	0159	0459	0759	1059	1,000	M	
CKR22BX122K	0160	0460	0760	1060	1,200	K	100
CKR22BX152K	0161	0461	0761	1061	1,500	K	
CKR22BX152M	0162	0462	0762	1062	1,500	M	
CKR22BX182K	0163	0463	0763	1063	1,800	K	
CKR22BX222K	0164	0464	0764	1064	2,200	K	100
CKR22BX222M	0165	0465	0765	1065	2,200	M	
CKR22BX272K	0166	0466	0766	1066	2,700	K	
CKR22BX332K	0167	0467	0767	1067	3,300	K	
CKR22BX332M	0168	0468	0768	1068	3,300	M	100
CKR22BX392K	0169	0469	0769	1069	3,900	K	
CKR22BX472K	0170	0470	0770	1070	4,700	K	
CKR22BX472M	0171	0471	0771	1071	4,700	M	
CKR22BX562K	0172	0472	0772	1072	5,600	K	50
CKR22BX682K	0173	0473	0773	1073	6,800	K	
CKR22BX682M	0174	0474	0774	1074	6,800	M	
CKR22BX822K	0175	0475	0775	1075	8,200	K	
CKR22BX103K	0176	0476	0776	1076	10,000	K	50
CKR22BX103M	0177	0477	0777	1077	10,000	M	
CKR22BX123K	0178	0478	0778	1078	12,000	K	
CKR22BX153K	0179	0479	0779	1079	15,000	K	
CKR22BX153M	0180	0480	0780	1080	15,000	M	50
CKR22BX183K	0181	0481	0781	1081	18,000	K	
CKR22BX223K	0182	0482	0782	1082	22,000	K	
CKR22BX223M	0183	0483	0783	1083	22,000	M	
CKR22BX273K	0184	0484	0784	1084	27,000	K	50
CKR22BX333K	0185	0485	0785	1085	33,000	K	
CKR22BX333M	0186	0486	0786	1086	33,000	M	
CKR22BX393K	0187	0487	0787	1087	39,000	K	
CKR22BX473K	0188	0488	0788	1088	47,000	K	50
CKR22BX473M	0189	0489	0789	1089	47,000	M	
CKR22BX563K	0190	0490	0790	1090	56,000	K	
CKR22BX683K	0191	0491	0791	1091	68,000	K	
CKR22BX683M	0192	0492	0792	1092	68,000	M	50
CKR22BX823K	0193	0493	0793	1093	82,000	K	
CKR22BX104K	0194	0494	0794	1094	100,000	K	
CKR22BX104M	0195	0495	0795	1095	100,000	M	

\_\_\_ Add appropriate failure rate level (M, P, R, or S).

# MIL-C-39014/2 Pin DIP

## MILITARY DASH NUMBER IDENTIFICATION CKR23 to MIL-C-39014/22 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
Style CKR23, Voltage-temperature limits of 0±60 ppm/°C.							
CKR23CG561F	0258	0558	0858	1158	560	F	200
CKR23CG561J	0259	0559	0859	1159	560	J	
CKR23CG561K	0260	0560	0860	1160	560	K	
CKR23CG681F	0261	0561	0861	1161	680	F	
CKR23CG681J	0262	0562	0862	1162	680	J	
CKR23CG681K	0263	0563	0863	1163	680	K	
CKR23CG821F	0264	0564	0864	1164	820	F	
CKR23CG821J	0265	0565	0865	1165	820	J	
CKR23CG821K	0266	0566	0866	1166	820	K	
CKR23CG102F	0267	0567	0867	1167	1,000	F	
CKR23CG102J	0268	0568	0868	1168	1,000	J	
CKR23CG102K	0269	0569	0869	1169	1,000	K	
CKR23CG122F	0270	0570	0870	1170	1,200	F	
CKR23CG122J	0271	0571	0871	1171	1,200	J	
CKR23CG122K	0272	0572	0872	1172	1,200	K	
CKR23CG272F	0273	0573	0873	1173	2,700	F	
CKR23CG272J	0274	0574	0874	1174	2,700	J	
CKR23CG272K	0275	0575	0875	1175	2,700	K	
CKR23CG332F	0276	0576	0876	1176	3,300	F	
CKR23CG332J	0277	0577	0877	1177	3,300	J	
CKR23CG332K	0278	0578	0878	1178	3,300	K	
CKR23CG472F	0279	0579	0879	1179	4,700	F	
CKR23CG472J	0280	0580	0880	1180	4,700	J	
CKR23CG472K	0281	0581	0881	1181	4,700	K	
CKR23CG562F	0282	0582	0882	1182	5,600	F	
CKR23CG562J	0283	0583	0883	1183	5,600	J	
CKR23CG562K	0284	0584	0884	1184	5,600	K	
CKR23CG682F	0285	0585	0885	1185	6,800	F	
CKR23CG682J	0286	0586	0886	1186	6,800	J	
CKR23CG682K	0287	0587	0887	1187	6,800	K	
CKR23CG822F	0288	0588	0888	1188	8,200	F	
CKR23CG822J	0289	0589	0889	1189	8,200	J	
CKR23CG822K	0290	0590	0890	1190	8,200	K	
CKR23CG103F	0291	0591	0891	1191	10,000	F	
CKR23CG103J	0292	0592	0892	1192	10,000	J	
CKR23CG103K	0293	0593	0893	1193	10,000	K	
Style CKR23, Voltage-temperature limits of ±15% (+15%, -25% for Rated Voltage).							
CKR23BX102K	0196	0496	0796	1096	1,000	K	200
CKR23BX102M	0197	0497	0797	1097	1,000	M	
CKR23BX122K	0198	0498	0798	1098	1,200	K	
CKR23BX152K	0199	0499	0799	1099	1,500	K	
CKR23BX152M	0200	0500	0800	1100	1,500	M	
CKR23BX182K	0201	0501	0801	1101	1,800	K	
CKR23BX222K	0202	0502	0802	1102	2,200	K	
CKR23BX222M	0203	0503	0803	1103	2,200	M	
CKR23BX272K	0204	0504	0804	1104	2,700	K	
CKR23BX332K	0205	0505	0805	1105	3,300	K	
CKR23BX332M	0206	0506	0806	1106	3,300	M	
CKR23BX392K	0207	0507	0807	1107	3,900	K	
CKR23BX472K	0208	0508	0808	1108	4,700	K	
CKR23BX472M	0209	0509	0809	1109	4,700	M	
CKR23BX562K	0210	0510	0810	1110	5,600	K	
CKR23BX682K	0211	0511	0811	1111	6,800	K	
CKR23BX682M	0212	0512	0812	1112	6,800	M	
CKR23BX822K	0213	0513	0813	1113	8,200	K	
CKR23BX103K	0214	0514	0814	1114	10,000	K	
CKR23BX103M	0215	0515	0815	1115	10,000	M	
CKR23BX123K	0216	0516	0816	1116	12,000	K	
CKR23BX153K	0217	0517	0817	1117	15,000	K	
CKR23BX153M	0218	0518	0818	1118	15,000	M	
CKR23BX183K	0219	0519	0819	1119	18,000	K	
CKR23BX223K	0220	0520	0820	1120	22,000	K	
CKR23BX223M	0221	0521	0821	1121	22,000	M	
CKR23BX273K	0222	0522	0822	1122	27,000	K	
CKR23BX333K	0223	0523	0823	1123	33,000	K	
CKR23BX333M	0224	0524	0824	1124	33,000	M	
CKR23BX393K	0225	0525	0825	1125	39,000	K	
CKR23BX473K	0226	0526	0826	1126	47,000	K	
CKR23BX473M	0227	0527	0827	1127	47,000	M	
CKR23BX563K	0228	0528	0828	1128	56,000	K	
CKR23BX683K	0229	0529	0829	1129	68,000	K	
CKR23BX683M	0230	0530	0830	1130	68,000	M	
CKR23BX823K	0231	0531	0831	1131	82,000	K	
CKR23BX104K	0232	0532	0832	1132	100,000	K	
CKR23BX104M	0233	0533	0833	1133	100,000	M	
CKR23BX124K	0234	0534	0834	1134	120,000	K	
CKR23BX154K	0235	0535	0835	1135	150,000	K	
CKR23BX154M	0236	0536	0836	1136	150,000	M	
CKR23BX184K	0237	0537	0837	1137	180,000	K	
CKR23BX224K	0238	0538	0838	1138	220,000	K	
CKR23BX224M	0239	0539	0839	1139	220,000	M	

— Add appropriate failure rate level (M, P, R, or S)

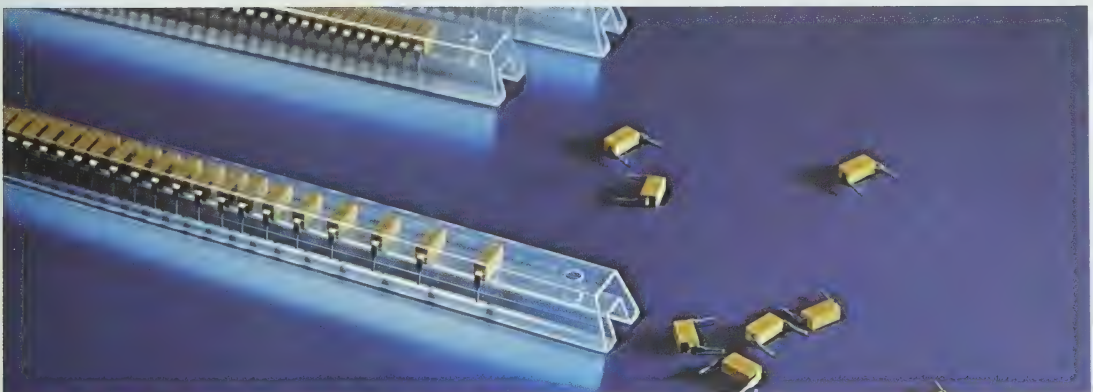
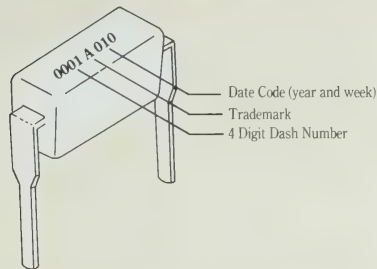


# MILITARY DASH NUMBER IDENTIFICATION CKR24 to MIL-C-39014/22 (Dash Number From Table)

Military Type Designation	Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance	WVDC
	1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
	Style CKR24, Voltage-temperature limits of ±15% (+15, -40% for Rated Voltage)						
CKR24BR124K	0240	0540	0840	1140	120,000	K	100 100 100 50  ↓   <

— Add appropriate failure rate level (M, P, R, or S).

## MARKING



# MIL-C-11015/Radial Leads

## HOW TO ORDER

### Military Type Designation: Styles CK05, CK06

For values, tolerances, voltages, sizes configurations and dielectrics not shown, contact AVX facilities directly for information.

### Part No. Example

	CK05	BX	104	K
Style				
Voltage-Temperature Limits				
Capacitance Code				
Capacitance Tolerance				

### MIL Part No. Codes

Style: CK = general purpose, ceramic dielectric, fixed capacitors.  
05 = Remaining two numbers identify shape and dimension.

### Voltage-Temperature Limits:

First letter identifies temperature range.  
B = -55°C to +125°C

Second letter identifies voltage-temperature coefficient.

Capacitance Change with Reference to 25°C		
Second Letter	No Voltage	Rated Voltage
X	+15, -15%	+15, -25%

### Sig. Fig. Capacitance and Multiplier:

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 100,000 pF as 104.

Capacitance Tolerances: K =  $\pm 10\%$ , M =  $\pm 20\%$

Packaging: CK05 1000 per bag  
CK06 1000 per bag

Radial tape and reel packaging  
available upon request.

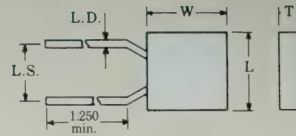


Figure 1

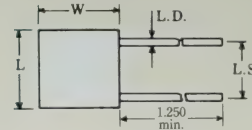


Figure 2

## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Case Size	Per MIL Spec	
MIL-C-11015	CK05 (Fig. 1)	CK06 (Fig. 2)
Length (L)	4.83 $\pm$ .25 (.190 $\pm$ .010)	7.37 $\pm$ .25 (.290 $\pm$ .010)
Width (W)	4.83 $\pm$ .25 (.190 $\pm$ .010)	7.37 $\pm$ .25 (.290 $\pm$ .010)
Thickness (T)	2.29 $\pm$ .25 (.090 $\pm$ .010)	2.29 $\pm$ .25 (.090 $\pm$ .010)
Lead Spacing (L.S.)	5.08 $\pm$ .38 (.200 $\pm$ .015)	5.08 $\pm$ .38 (.200 $\pm$ .015)
Lead Diameter (L.D.)	.64 $\pm$ .05 (.025 $\pm$ .002)	.64 $\pm$ .05 (.025 $\pm$ .002)

# MILITARY PART NUMBER IDENTIFICATION CK05 and CK06

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CK05 (BX)			
CK05BX100_	10	K, M	200
CK05BX120K_	12	K	200
CK05BX150_	15	K, M	200
CK05BX180K_	18	K	200
CK05BX220_	22	K, M	200
CK05BX270K_	27	K	200
CK05BX330_	33	K, M	200
CK05BX390K_	39	K	200
CK05BX470_	47	K, M	200
CK05BX560K_	56	K	200
CK05BX680_	68	K, M	200
CK05BX820K_	82	K	200
CK05BX101_	100	K, M	200
CK05BX121K_	120	K	200
CK05BX151_	150	K, M	200
CK05BX181K_	180	K	200
CK05BX221_	220	K, M	200
CK05BX271K_	270	K	200
CK05BX331_	330	K, M	200
CK05BX391K_	390	K	200
CK05BX471_	470	K, M	200
CK05BX561K_	560	K	200
CK05BX681_	680	K, M	200
CK05BX821K_	820	K	200
CK05BX102_	1,000	K, M	200
CK05BX122_	1,200	K	100
CK05BX152_	1,500	K, M	100
CK05BX182K_	1,800	K	100
CK05BX222_	2,200	K, M	100
CK05BX272K_	2,700	K	100
CK05BX332_	3,300	K, M	100
CK05BX392K_	3,900	K	100
CK05BX472_	4,700	K, M	100
CK05BX562K_	5,600	K	100
CK05BX682_	6,800	K, M	100
CK05BX822K_	8,200	K	100
CK05BX103_	10,000	K, M	100
CK05BX123K_	12,000	K	50
CK05BX153_	15,000	K, M	50
CK05BX183K_	18,000	K	50
CK05BX223_	22,000	K, M	50
CK05BX273K_	27,000	K	50
CK05BX333_	33,000	K, M	50
CK05BX393K_	39,000	K	50
CK05BX473_	47,000	K, M	50
CK05BX563K_	56,000	K	50
CK05BX683_	68,000	K, M	50
CK05BX823K_	82,000	K	50
CK05BX104_	100,000	K, M	50

Add capacitance tolerance letter K =  $\pm 10\%$  or M =  $\pm 20\%$

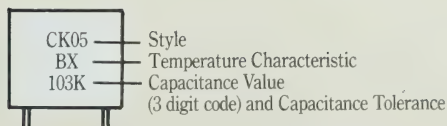
Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CK06 (BX)			
CK06BX122K_	1,200	K	200
CK06BX152_	1,500	K, M	200
CK06BX182K_	1,800	K	200
CK06BX222_	2,200	K, M	200
CK06BX272K_	2,700	K	200
CK06BX332_	3,300	K, M	200
CK06BX392K_	3,900	K	200
CK06BX472_	4,700	K, M	200
CK06BX562K_	5,600	K	200
CK06BX682_	6,800	K, M	200
CK06BX822K_	8,200	K	200
CK06BX103_	10,000	K, M	200
CK06BX123K_	12,000	K	100
CK06BX153_	15,000	K, M	100
CK06BX183K_	18,000	K	100
CK06BX223_	22,000	K, M	100
CK06BX273K_	27,000	K	100
CK06BX333_	33,000	K, M	100
CK06BX393K_	39,000	K	100
CK06BX473_	47,000	K, M	100
CK06BX563K_	56,000	K	100
CK06BX683_	68,000	K, M	100
CK06BX823K_	82,000	K	100
CK06BX104_	100,000	K, M	100
CK06BX124K_	120,000	K	50
CK06BX154_	150,000	K, M	50
CK06BX184K_	180,000	K	50
CK06BX224_	220,000	K, M	50
CK06BX274K_	270,000	K	50
CK06BX334_	330,000	K, M	50
CK06BX394K_	390,000	K	50
CK06BX474_	470,000	K, M	50
CK06BX564K_	560,000	K	50
CK06BX684_	680,000	K, M	50
CK06BX824K_	820,000	K	50
CK06BX105_	1.0 mfd	K, M	50

Add capacitance tolerance letter K =  $\pm 10\%$  or M =  $\pm 20\%$

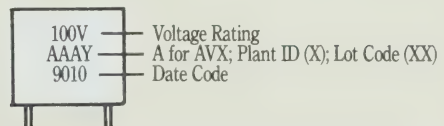
## MARKING

### CK05/CK06

Front



Back





# MIL-C-11015/Axial Leads

## HOW TO ORDER

Military Type Designation: Styles CK12, CK13, CK15, CK16

Part No. Example

	CK12	BX	103	K
Style				
Voltage-Temperature Limits				
Capacitance Code				
Capacitance Tolerance				

### MIL Part No. Codes

Style: CK = general purpose, ceramic dielectric, fixed capacitors.  
12 = Remaining two numbers identify shape and dimension.

### Voltage-Temperature Limits:

First letter identifies temperature range.  
B = -55°C to +125°C

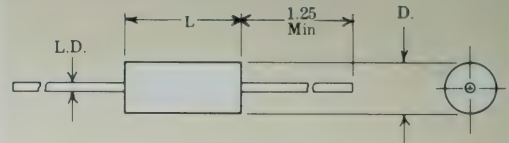
Second letter identifies voltage-temperature coefficient.

Capacitance Change with Reference to 25°C		
Second Letter	No Voltage	Rated Voltage
R	+15, -15%	+15, -40%
X	+15, -15%	+15, -25%

### Sig. Fig. Capacitance and Multiplier:

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 10,000 pF as 103.

Capacitance Tolerances: K =  $\pm 10\%$ , M =  $\pm 20\%$



## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Case Size	Per MIL Spec				
MIL-C-11015	CK12	CK13	CK14	CK15	CK16
Length (L)	4.07 $\pm$ .25 (.160 $\pm$ .010)	6.35 $\pm$ .25 (.250 $\pm$ .010)	9.91 $\pm$ .25 (.390 $\pm$ .010)	12.7 $\pm$ .51 (.500 $\pm$ .020)	17.53 $\pm$ .51 (.690 $\pm$ .020)
Diameter (D)	2.29 $\pm$ .25 (.090 $\pm$ .010)	2.29 $\pm$ .25 (.090 $\pm$ .010)	3.36 $\pm$ .25 (.140 $\pm$ .010)	6.35 $\pm$ .38 (.250 $\pm$ .015)	8.89 $\pm$ .51 (.350 $\pm$ .015)
Lead Diameter (L.D)	.48 $\pm$ .05 (.019 $\pm$ .002)	.48 $\pm$ .05 (.019 $\pm$ .002)	.63 $\pm$ .051 (.025 $\pm$ .002)	.63 $\pm$ .05 (.025 $\pm$ .002)	.63 $\pm$ .05 (.025 $\pm$ .002)

## PACKAGING REQUIREMENTS

Packaging: 50 pcs per bag

# MILITARY PART NUMBER IDENTIFICATION CK12 thru CK16

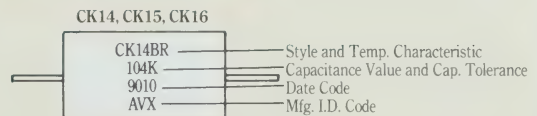
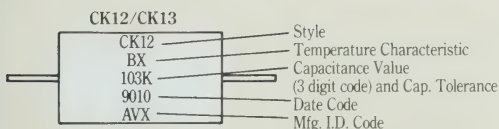
Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CK12 (BX)			
CK12BX100_	10	K, M	100
CK12BX120K	12	K	100
CK12BX150_	15	K, M	100
CK12BX180K	18	K	100
CK12BX220_	22	K, M	100
CK12BX270K	27	K	100
CK12BX330_	33	K, M	100
CK12BX390K	39	K	100
CK12BX470_	47	K, M	100
CK12BX560K	56	K	100
CK12BX680_	68	K, M	100
CK12BX820K	82	K	100
CK12BX101_	100	K, M	100
CK12BX121K	120	K	100
CK12BX151_	150	K, M	100
CK12BX181K	180	K	100
CK12BX221_	220	K, M	100
CK12BX271K	270	K	100
CK12BX331_	330	K, M	100
CK12BX391K	390	K	100
CK12BX471_	470	K, M	100
CK12BX561K	560	K	100
CK12BX681_	680	K, M	100
CK12BX821K	820	K	100
CK12BX102_	1,000	K, M	100
CK12BX122K	1,200	K	100
CK12BX152_	1,500	K, M	100
CK12BX182K	1,800	K	100
CK12BX222_	2,200	K, M	100
CK12BX272K	2,700	K	100
CK12BX332_	3,300	K, M	100
CK12BX392K	3,900	K	100
CK12BX472_	4,700	K, M	100
CK12BX562K	5,600	K	50
CK12BX682_	6,800	K, M	50
CK12BX822K	8,200	K	50
CK12BX103_	10,000	K, M	50
CK13 (BX)			
CK13BX562K	5,600	K	100
CK13BX682_	6,800	K, M	100
CK13BX822K	8,200	K	100
CK13BX103_	10,000	K, M	100
CK13BX123K	12,000	K	50
CK13BX153_	15,000	K, M	50
CK13BX183K	18,000	K	50
CK13BX223_	22,000	K, M	50
CK13 (BR)			
CK13BR273K	27,000	K	50
CK13BX333_	33,000	K, M	50
CK13BX393K	39,000	K	50
CK13BX473_	47,000	K, M	50

\_\_\_\_ Add capacitance tolerance letter K=±10% or M=±20%.

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CK14 (BX)			
CK14BX123K	12,000	K	100
CK14BX153_	15,000	K, M	100
CK14BX183K	18,000	K	100
CK14BX223_	22,000	K, M	100
CK14BX273K	27,000	K	100
CK14BX333_	33,000	K, M	100
CK14BX393K	39,000	K	100
CK14BX473_	47,000	K, M	100
CK14 (BR)			
CK14BR563K	56,000	K	100
CK14BR683_	68,000	K, M	100
CK14BR823K	82,000	K	100
CK14BR104_	100,000	K, M	100
CK14BR124K	120,000	K	50
CK14BR154_	150,000	K, M	50
CK14BR184K	180,000	K	50
CK14BR224_	220,000	K, M	50
CK14BR274K	270,000	K	50
CK15 (BX)			
CK15BX104K	100,000	K, M	100
CK15 (BR)			
CK15BR124K	120,000	K	100
CK15BR154_	150,000	K, M	100
CK15BR184K	180,000	K	100
CK15BR224_	220,000	K, M	100
CK15BR274K	270,000	K	100
CK15BR334_	330,000	K, M	100
CK15BR474K	470,000	K	50
CK15BR105_	1,000,000	K, M	50
CK16 (BR)			
CK16BR474K	470,000	K, M	100
CK16BR105_	1,000,000	K, M	100
CK16BR225_	2,200,000	K, M	50
CK16BR335_	3,300,000	K, M	50

\_\_\_\_ Add capacitance tolerance letter K=±10% or M=±20%.

## MARKING



# MIL-C-20/Radial Leads

## HOW TO ORDER

### Military Type Designation:

Established Reliability = CCR05, CCR06, CCR07, CCR08, CCR09

Non-Established Reliability = CC05, CC06, CC07, CC08, CC09

Part No. Example

Style	CCR06	CG	183	J	R	(V)
Temperature Characteristic						
Capacitance Code						
Capacitance Tolerance						
Military Failure Rate						
Stand-off Option						

### MIL Part No. Codes

Style: CC=identifies temperature compensating, ceramic dielectric, fixed capacitors.

R = identifies Established Reliability parts.

06 = Numbers identify shape and dimension.

### Temperature Characteristic:

Temp.	Permissible capacitance change from capacitance at +25°C in ppm/°C				
	Characteristic				
	CX	CK	CJ	CH	CG
+125°C	1/	±250 ppm/°C	±120 ppm/°C	±60 ppm/°C	±30 ppm/°C
-55°C 2/	1/	+246.25 -326.25	+116.25 -166.25	+55.00 -91.25	+27.50 -53.75

1/ Not practically measurable.

2/ The ppm/°C values for -55°C were calculated by dividing ppm by negative 80°C.

### Capacitance Code:

First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 18,000 pF as 183. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R4 = 1.4 pF).

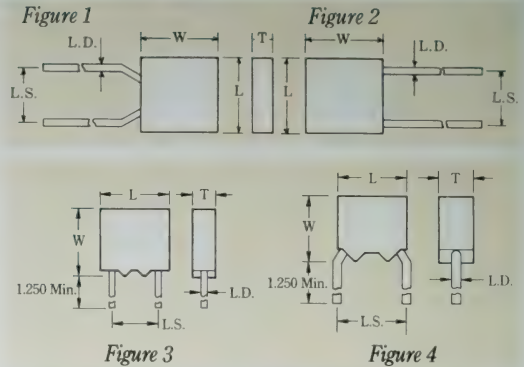
### Capacitance Tolerance:

C = ±0.25 pF, D = ±0.5 pF, F = ±1%, G = ±2%, J = ±5%, K = ±10%.

### Military Failure Rate:

M = 1% per 1000 hours, P = 0.1% per 1000 hours,

R = 0.01% per 1000 hours, S = 0.001% per 1000 hours.



To order stand-off option, place "V" at the end of the part number. For example: CCR05CG332FSV.

## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Per MIL Spec	Case Size				
MIL-C-20	Length (L)	Width (W)	Thickness (T)	Lead Spacing (L.S.)	Lead Diameter (L.D.)
CCR05/CC05 Figures 1, 4	4.38±.25 (.190±.010)	4.38±.25 (.190±.010)	2.29±.25 (.090±.010)	5.08±.38 (.200±.015)	.64±.05 (.025±.002)
CCR06/CC06 Figures 2, 3	7.37±.25 (.290±.010)	7.37±.25 (.290±.010)	2.29±.25 (.090±.010)	5.08±.38 (.200±.015)	.64±.05 (.025±.002)
CCR07/CC07 Figure 2	12.19±.51 (.480±.020)	12.91±.51 (.480±.020)	3.56±.25 (.140±.010)	10.16±.51 (.400±.020)	.64±.05 (.025±.002)
CCR08/CC08 Figure 2	12.19±.51 (.480±.020)	12.10±.51 (.480±.020)	6.1±.25 (.240±.010)	10.16±.51 (.400±.020)	.64±.05 (.025±.002)
CCR09/CC09 Figure 2	4.38±.25 (.190±.010)	4.38±.25 (.190±.010)	2.29±.25 (.090±.010)	2.54±.38 (.100±.015)	.64±.05 (.025±.002)

## PACKAGING REQUIREMENTS

Packaging: CCR0X: 100 pcs/bag; CC0X: 1000 pcs/bag

## MILITARY PART NUMBER IDENTIFICATION

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC05-CCR05, CC09-CCR09			
CCR05CX1R0	1.0	C	200
CCR05CX1R1	1.1	C	200
CCR05CX1R2	1.2	C	200
CCR05CX1R3	1.3	C	200
CCR05CX1R5	1.5	C	200
CCR05CX1R6	1.6	C	200
CCR05CX1R8	1.8	C	200
CCR05CX2R0	2.0	C	200
CCR05CX2R2	2.2	C	200
CCR05CX2R4	2.4	C	200
CCR05CX2R7	2.7	C, D	200
CCR05CX3R0	3.0	C, D	200
CCR05CX3R3	3.3	C, D	200
CCR05CX3R6	3.6	C, D	200
CCR05CX3R9	3.9	C, D	200

— Add approp. failure rate level (M, P, R, or S), add V for Stand-off  
— Add appropriate cap. tolerance letter

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC05-CCR05, CC09-CCR09			
CCR05CJ4R3	4.3	C, D	200
CCR05CJ4R7	4.7	C, D	200
CCR05CJ5R1	5.1	C, D	200
CCR05CJ5R6	5.6	C, D	200
CCR05CJ6R2	6.2	C, D	200
CCR05CJ6R8	6.8	C, D	200
CCR05CJ7R5	7.5	C, D	200
CCR05CJ8R2	8.2	C, D	200
CCR05CJ9R1	9.1	C, D	200
CCR05CH100	10	G, J	200
CCR05CH110	11	G, J	200
CCR05CH120	12	G, J	200
CCR05CH130	13	G, J	200
CCR05CH150	15	G, J	200
CCR05CH160	16	G, J	200

— Add approp. failure rate level (M, P, R, or S), add V for Stand-off  
— Add appropriate cap. tolerance letter



## MILITARY PART NUMBER IDENTIFICATION

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC05-CCR05, CC09-CCR09			
CCR05CH180	18	G, J	200
CCR05CG200	20	G, J	200
CCR05CG220	22	G, J	200
CCR05CG240	24	G, J	200
CCR05CG270	27	F, G, J	200
CCR05CG300	30	F, G, J	200
CCR05CG330	33	F, G, J	200
CCR05CG360	36	F, G, J	200
CCR05CG390	39	F, G, J	200
CCR05CG430	43	F, G, J	200
CCR05CG470	47	F, G, J	200
CCR05CG510	51	F, G, J	200
CCR05CG560	56	F, G, J	200
CCR05CG620	62	F, G, J	200
CCR05CG680	68	F, G, J	200
CCR05CG750	75	F, G, J	200
CCR05CG820	82	F, G, J	200
CCR05CG910	91	F, G, J	200
CCR05CG101	100	F, G, J	200
CCR05CG111	110	F, G, J	200
CCR05CG121	120	F, G, J	200
CCR05CG131	130	F, G, J	200
CCR05CG151	150	F, G, J	200
CCR05CG161	160	F, G, J	200
CCR05CG181	180	F, G, J	200
CCR05CG201	200	F, G, J	200
CCR05CG221	220	F, G, J	200
CCR05CG241	240	F, G, J	200
CCR05CG271	270	F, G, J	200
CCR05CG301	300	F, G, J	200
CCR05CG331	330	F, G, J	200
CCR05CG361	360	F, G, J	100
CCR05CG391	390	F, G, J	100
CCR05CG431	430	F, G, J	100
CCR05CG471	470	F, G, J	100
CCR05CG511	510	F, G, J	100
CCR05CG561	560	F, G, J	100
CCR05CG621	620	F, G, J	100
CCR05CG681	680	F, G, J	100
CCR05CG751	750	F, G, J	100
CCR05CG821	820	F, G, J	100
CCR05CG911	910	F, G, J	100
CCR05CG102	1,000	F, G, J	100
CCR05CG112	1,100	F, G, J	100
CCR05CG122	1,200	F, G, J	100
CCR05CG132	1,300	F, G, J	100
CCR05CG152	1,500	F, G, J	100
CCR05CG162	1,600	F, G, J	100
CCR05CG182	1,800	F, G, J	100
CCR05CG202	2,000	F, G, J	50
CCR05CG222	2,200	F, G, J	50
CCR05CG242	2,400	F, G, J	50
CCR05CG272	2,700	F, G, J	50
CCR05CG302	3,000	F, G, J	50
CCR05CG332	3,300	F, G, J	50
CC06, CCR06			
CCR06CG361	360	F, G, J	200
CCR06CG391	390	F, G, J	200
CCR06CG431	430	F, G, J	200
CCR06CG471	470	F, G, J	200
CCR06CG511	510	F, G, J	200
CCR06CG561	560	F, G, J	200
CCR06CG621	620	F, G, J	200
CCR06CG681	680	F, G, J	200
CCR06CG751	750	F, G, J	200
CCR06CG821	820	F, G, J	200

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC06, CCR06 (cont)			
CCR06CG911	910	F, G, J	200
CCR06CG102	1,000	F, G, J	200
CCR06CG112	1,100	F, G, J	200
CCR06CG122	1,200	F, G, J	200
CCR06CG132	1,300	F, G, J	200
CCR06CG152	1,500	F, G, J	200
CCR06CG162	1,600	F, G, J	200
CCR06CG182	1,800	F, G, J	200
CCR06CG202	2,000	F, G, J	100
CCR06CG222	2,200	F, G, J	100
CCR06CG242	2,400	F, G, J	100
CCR06CG272	2,700	F, G, J	100
CCR06CG302	3,000	F, G, J	100
CCR06CG332	3,300	F, G, J	100
CCR06CG362	3,600	F, G, J	100
CCR06CG392	3,900	F, G, J	100
CCR06CG432	4,300	F, G, J	100
CCR06CG472	4,700	F, G, J	100
CCR06CG512	5,100	F, G, J, K	50
CCR06CG562	5,600	F, G, J, K	50
CCR06CG622	6,200	F, G, J, K	50
CCR06CG682	6,800	F, G, J, K	50
CCR06CG752	7,500	F, G, J, K	50
CCR06CG822	8,200	F, G, J, K	50
CCR06CG912	9,100	F, G, J, K	50
CCR06CG103	10,000	F, G, J, K	50
CCR06CG123	12,000	F, G, J, K	50
CCR06CG153	15,000	F, G, J, K	50
CCR06CG183	18,000	F, G, J, K	50
CC07, CCR07			
CCR07CG222	2,200	F, G, J, K	200
CCR07CG272	2,700	F, G, J, K	200
CCR07CG332	3,300	F, G, J, K	200
CCR07CG392	3,900	F, G, J, K	200
CCR07CG472	4,700	F, G, J, K	200
CCR07CG562	5,600	F, G, J, K	100
CCR07CG682	6,800	F, G, J, K	100
CCR07CG822	8,200	F, G, J, K	100
CCR07CG103	10,000	F, G, J, K	100
CCR07CG123	12,000	F, G, J, K	100
CCR07CG153	15,000	F, G, J, K	50
CCR07CG183	18,000	F, G, J, K	50
CCR07CG223	22,000	F, G, J, K	50
CCR07CG273	27,000	F, G, J, K	50
CCR07CG333	33,000	F, G, J, K	50
CCR07CG393	39,000	F, G, J, K	50
CCR07CG473	47,000	F, G, J, K	50
CCR07CG563	56,000	F, G, J, K	50
CCR07CG683	68,000	F, G, J, K	50
CCR07CG823	82,000	F, G, J, K	50
CCR07CG104	100,000	F, G, J, K	50
CC08, CCR08			
CCR08CG392	3,900	G, J, K	200
CCR08CG472	4,700	G, J, K	200
CCR08CG153	15,000	G, J, K	100
CCR08CG183	18,000	G, J, K	100
CCR08CG563	56,000	G, J, K	50
CCR08CG683	68,000	G, J, K	50

L Add appropriate failure rate level (M, P, R, or S)  
 Add appropriate cap. tolerance letter

Note: For marking information, see page 67.

# MIL-C-20/Axial Leads

## HOW TO ORDER

### Military Type Designation:

Established Reliability = CCR75, CCR76, CCR77, CCR78, CCR79

Non-Established Reliability = CC75, CC76, CC77, CC78, CC79

### Part No. Example

	CCR76	CG	102	J	R
Style					
Temperature Characteristic					
Capacitance Code					
Capacitance Tolerance					
Military Failure Rate					

### MIL Part No. Codes

Style: CC = identifies temperature compensating, ceramic dielectric, fixed capacitors.

R = identifies Established Reliability parts.

76 = Numbers identify shape and dimension.

### Temperature Characteristic:

Permissible capacitance change from capacitance at +25°C in ppm/°C					
Temp.	Characteristic				
	CX	CK	CJ	CH	CG
+125°C	1/	±250 ppm/°C	±120 ppm/°C	±60 ppm/°C	±30 ppm/°C
-55°C 2/	1/	+246.25 -326.25	+116.25 -166.25	+55.00 -91.25	+27.50 -53.75

1/ Not practically measurable.

### Capacitance Code:

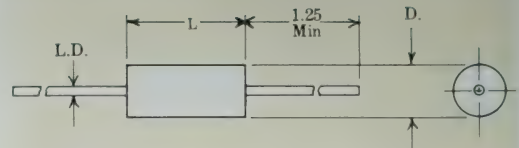
First two digits are the significant figures of capacitance. Third digit indicates the additional number of zeros. For example, order 1,000 pF as 102. (For values below 10 pF, use "R" in place of decimal point, e.g., 1R8 = 1.8 pF).

### Capacitance Tolerance:

C = ±0.25 pF, D = ±0.5 pF, F = ±1%, G = ±2%, J = ±5%, K = ±10%.

### Military Failure Rate:

M = 1% per 1000 hours, P = 0.1% per 1000 hours, R = 0.01% per 1000 hours, S = 0.001% per 1000 hours.



## SIZE SPECIFICATIONS

Dimensions: Millimeters (Inches)

Per MIL Spec	Case Size		
MIL-C-20	Length (L)	Diameter (D)	Lead Diameter (L.D.)
CCR75 CC75	4.07 ± 0.25 (.160 ± .010)	2.29 ± 0.25 (.090 ± .010)	.48 ± .05 (.019 ± .002)
CCR76 CC76	6.35 ± 0.25 (.250 ± .010)	2.29 ± 0.25 (.090 ± .010)	.48 ± .05 (.019 ± .002)
CCR77 CC77	9.91 ± 0.25 (.390 ± .010)	3.36 ± 0.25 (.140 ± .010)	.63 ± .051 (.025 ± .002)
CCR78 CC78	12.7 ± 0.51 (.500 ± .020)	6.35 ± 0.38 (.250 ± .015)	.63 ± .05 (.025 ± .002)
CCR79 CC79	17.53 ± 0.51 (.690 ± .020)	8.89 ± 0.51 (.350 ± .015)	.63 ± .05 (.025 ± .002)

## PACKAGING REQUIREMENTS

### Packaging:

Bulk or Tape and Reel

CCR75/CC75 and CCR76/CC76 - 4500 pcs/reel

CCR77/CC77 - 3000 pcs/reel

# MILITARY PART NUMBER IDENTIFICATION CC75 thru CC79 and CCR75 thru CCR79

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC75-CCR75			
CCR75CX1R0	1.0	C	200
CCR75CX1R1	1.1	C	200
CCR75CX1R2	1.2	C	200
CCR75CX1R3	1.3	C	200
CCR75CX1R5	1.5	C	200
CCR75CX1R6	1.6	C	200
CCR75CX1R8	1.8	C	200
CCR75CX2R0	2.0	C	200
CCR75CK2R2	2.2	C	200
CCR75CK2R4	2.4	C	200
CCR75CK2R7	2.7	C, D	200
CCR75CK3R0	3.0	C, D	200
CCR75CK3R3	3.3	C, D	200
CCR75CK3R6	3.6	C, D	200
CCR75CK3R9	3.9	C, D	200
CCR75CJ4R3	4.3	C, D	200
CCR75CJ4R7	4.7	C, D	200
CCR75CJ5R1	5.1	C, D	200
CCR75CJ5R6	5.6	C, D	200
CCR75CJ6R2	6.2	C, D	200
CCR75CJ6R8	6.8	C, D	200
CCR75CJ7R5	7.5	C, D	200
CCR75CH8R2	8.2	C, D	200
CCR75CH9R1	9.1	C, D	200
CCR75CH100	10	G, J	200
CCR75CH110	11	G, J	200
CCR75CH120	12	G, J	200
CCR75CH130	13	G, J	200
CCR75CH150	15	G, J	200
CCR75CH160	16	G, J	200
CCR75CH180	18	G, J	200
CCR75CG200	20	F, G, J	200
CCR75CG220	22	F, G, J	200
CCR75CG240	24	F, G, J	200
CCR75CG270	27	F, G, J	200
CCR75CG300	30	F, G, J	200

Add appropriate failure rate level (M, P, R, or S)  
 Add appropriate cap. tolerance letter

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC75-CCR75			
CCR75CG330	33	F, G, J	200
CCR75CG360	36	F, G, J	200
CCR75CG390	39	F, G, J	200
CCR75CG430	43	F, G, J	200
CCR75CG470	47	F, G, J	200
CCR75CG510	51	F, G, J	200
CCR75CG560	56	F, G, J	200
CCR75CG620	62	F, G, J	200
CCR75CG680	68	F, G, J	200
CCR75CG750	75	F, G, J	200
CCR75CG820	82	F, G, J	100
CCR75CG910	91	F, G, J	100
CCR75CG101	100	F, G, J	100
CCR75CG111	110	F, G, J	100
CCR75CG121	120	F, G, J	100
CCR75CG131	130	F, G, J	100
CCR75CG151	150	F, G, J	100
CCR75CG161	160	F, G, J	100
CCR75CG181	180	F, G, J	100
CCR75CG201	200	F, G, J	100
CCR75CG221	220	F, G, J	100
CCR75CG241	240	F, G, J	100
CCR75CG271	270	F, G, J	50
CCR75CG301	300	F, G, J	50
CCR75CG331	330	F, G, J	50
CCR75CG361	360	F, G, J	50
CCR75CG391	390	F, G, J	50
CCR75CG431	430	F, G, J	50
CCR75CG471	470	F, G, J	50
CCR75CG511	510	F, G, J	50
CCR75CG561	560	F, G, J	50
CCR75CG621	620	F, G, J	50
CCR75CG681	680	F, G, J	50

Add appropriate failure rate level (M, P, R, or S)  
 Add appropriate cap. tolerance letter

Note: For marking information, see page 67.



# MIL-C-20/Axial Leads

## MILITARY PART NUMBER IDENTIFICATION CC75 thru CC79 and CCR75 thru CCR79

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC76, CCR76			
CCR76CG820	82	F, G, J	200
CCR76CG910	91	F, G, J	200
CCR76CG101	100	F, G, J	200
CCR76CG111	110	F, G, J	200
CCR76CG121	120	F, G, J	200
CCR76CG131	130	F, G, J	200
CCR76CG271	270	F, G, J	100
CCR76CG301	300	F, G, J	100
CCR76CG331	330	F, G, J	100
CCR76CG361	360	F, G, J	100
CCR76CG391	390	F, G, J	100
CCR76CG431	430	F, G, J	100
CCR76CG471	470	F, G, J	100
CCR76CG511	510	F, G, J	100
CCR76CG561	560	F, G, J	100
CCR76CG621	620	F, G, J	100
CCR76CG681	680	F, G, J	100
CCR76CG751	750	F, G, J	50
CCR76CG821	820	F, G, J	50
CCR76CG911	910	F, G, J	50
CCR76CG102	1,000	F, G, J	50
CC77, CCR77			
CCR77CG151	150	F, G, J	200
CCR77CG161	160	F, G, J	200
CCR77CG181	180	F, G, J	200
CCR77CG201	200	F, G, J	200
CCR77CG221	220	F, G, J	200
CCR77CG241	240	F, G, J	200
CCR77CG271	270	F, G, J	200
CCR77CG301	300	F, G, J	200
CCR77CG331	330	F, G, J	200
CCR77CG361	360	F, G, J	200
CCR77CG391	390	F, G, J	200
CCR77CG431	430	F, G, J	200
CCR77CG471	470	F, G, J	200
CCR77CG511	510	F, G, J	200
CCR77CG561	560	F, G, J	200
CCR77CG621	620	F, G, J	200
CCR77CG681	680	F, G, J	200
CCR77CG751	750	F, G, J	100
CCR77CG821	820	F, G, J	100
CCR77CG911	910	F, G, J	100
CCR77CG102	1,000	F, G, J	100
CCR77CG112	1,100	F, G, J	100
CCR77CG122	1,200	F, G, J	100
CCR77CG132	1,300	F, G, J	100
CCR77CG152	1,500	F, G, J	100
CCR77CG162	1,600	F, G, J	100
CCR77CG182	1,800	F, G, J	100
CCR77CG202	2,000	F, G, J	100
CCR77CG222	2,200	F, G, J	100
CCR77CG242	2,400	F, G, J	50
CCR77CG272	2,700	F, G, J	50

L Add appropriate failure rate level (M, P, R, or S)  
 Add appropriate cap. tolerance letter

Military Type Designation	Capacitance (pF)	Capacitance Tolerance	WVDC
CC77, CCR77, (cont)			
CCR77CG302	3,000	F, G, J	50
CCR77CG332	3,300	F, G, J	50
CCR77CG362	3,600	F, G, J	50
CCR77CG392	3,900	F, G, J	50
CCR77CG432	4,300	F, G, J	50
CCR77CG472	4,700	F, G, J	50
CCR77CG512	5,100	F, G, J, K	50
CCR77CG562	5,600	F, G, J, K	50
CC78, CCR78			
CCR78CG821	820	F, G, J, K	200
CCR78CG102	1,000	F, G, J, K	200
CCR78CG122	1,200	F, G, J, K	200
CCR78CG152	1,500	F, G, J, K	200
CCR78CG182	1,800	F, G, J, K	200
CCR78CG222	2,200	F, G, J, K	200
CCR78CG272	2,700	F, G, J, K	200
CCR78CG332	3,300	F, G, J, K	200
CCR78CG392	3,900	F, G, J, K	100
CCR78CG472	4,700	F, G, J, K	100
CCR78CG562	5,600	F, G, J, K	100
CCR78CG682	6,800	F, G, J, K	100
CCR78CG822	8,200	F, G, J, K	100
CCR78CG103	10,000	F, G, J, K	100
CCR78CG123	12,000	F, G, J, K	100
CCR78CG153	15,000	F, G, J, K	50
CCR78CG183	18,000	F, G, J, K	50
CCR78CG223	22,000	F, G, J, K	50
CCR78CG273	27,000	F, G, J, K	50
CC79, CCR79			
CCR79CG392	3,900	F, G, J, K	200
CCR79CG472	4,700	F, G, J, K	200
CCR79CG562	5,600	F, G, J, K	200
CCR79CG682	6,800	F, G, J, K	200
CCR79CG822	8,200	F, G, J, K	200
CCR79CG103	10,000	F, G, J, K	200
CCR79CG153	15,000	F, G, J, K	100
CCR79CG183	18,000	F, G, J, K	100
CCR79CG223	22,000	F, G, J, K	100
CCR79CG273	27,000	F, G, J, K	100
CCR79CG333	33,000	F, G, J, K	100
CCR79CG393	39,000	F, G, J, K	100
CCR79CG473	47,000	F, G, J, K	50
CCR79CG563	56,000	F, G, J, K	50
CCR79CG683	68,000	F, G, J, K	50
CCR79CG823	82,000	F, G, J, K	50

L Add appropriate failure rate level (M, P, R, or S)  
 Add appropriate cap. tolerance letter

Note: Complete type designation will include the appropriate capacitance tolerance in the 11th digit. For CC styles, delete 3rd and 12th digits.

Note: For marking information, see page 67.

# MIL-C-20

## MARKING

### Radials

#### CC05 & CC09

CC05
CH
100G

FRONT

9022
A0
4222

BACK

Date Code  
A=Lot Letter  
0=1st Digit of AVX FSCM #  
4222=Last four digits of AVX FSCM #

#### CCR05 & CCR09

CCR0
5CH1
00GM

FRONT

9032
AJ0
4222

BACK

Date Code  
A=Lot Letter  
J="J" or "JAN" Brand  
0=1st Digit of AVX FSCM #  
4222=Last four digits of AVX FSCM #

#### CC06

CC06
CG
102F

FRONT

9032A
200V
04222

BACK

Date Code & Lot Letter  
200V=Rated Voltage  
04222=AVX FSCM #

#### CCR06

CCR06
CG102
FM

FRONT

9032A
J200V
04222

BACK

Date Code & Lot Letter  
J="J" or "JAN" Brand  
200V=Rated Voltage  
04222=AVX FSCM #

#### CC07

CG
103
G0
AAVX

Characteristic  
Capacitance Value  
Cap. Tolerance & Year Code (0 for 1990)  
Lot Code & Trademark

#### CCR07

JCG
103
GM0
AAVX

"J" Brand (J) and Characteristic (CG)  
Capacitance Value  
Cap. Tolerance (G) FR Level (M),  
& year code (0 for 1990)  
Lot Code (A); and Trademark (AVX)

#### CC08

CC08CG
392K
AVX
96095
200V 9003A

Trademark or Manufacturer's Name  
Source Code (FSCM)  
Voltage, Date Code and Lot Symbol

#### CCR08

CCR08CG
392KM
JAN AVX
96095
200V 9003A

"JAN" Brand & Trademark or  
Manufacturer's Name  
Source Code (FSCM)  
Voltage, Date Code and Lot Symbol

### Axials

#### CC75, CC76

CG
101
G90
20AAA

Characteristic  
Capacitance Value  
Cap. Tolerance & 2 digit Year Code  
2 digit Week, 2 digit Lot Code, A for AVX

#### CCR75, CCR76

JCG
101
GM90
20AAA

"J" Brand (J) and Characteristic (CG)  
Capacitance Value  
Cap. Tolerance (G) FR Level (M),  
2 digit Year Code  
2 digit Week, A for AVX

#### CC77

CC77C
G151F
04222
9020AA

Type Designation  
FSCM  
4 digit Date Code, 2 digit Lot Code

#### CCR77

CCR77C
G151FM
J04222
9020AA

Type Designation  
"J" Brand and FSCM  
4 digit Date Code, 2 digit Lot Code

#### CC78, CC79

CC78CG
821K
AVX
04222
200V
9020AA

Type Designation  
Trademark or Manufacturer's Name  
Source Code (FSCM)  
Voltage  
4 digit Date Code

#### CCR78, CCR79

CCR78
CG
821KM
JAN A
04222
200V
9020AA

Type Designation  
TC  
Capacitance Tolerance, Failure Rate  
"JAN" Brand, A for AVX  
FSCM  
Voltage  
4 digit Date Code, 2 digit Lot Code

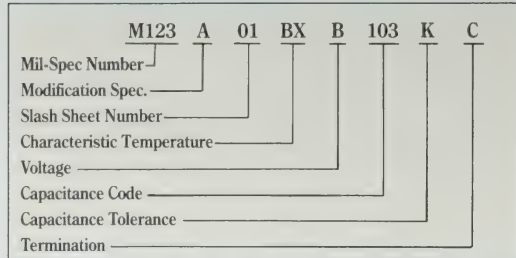
# MIL-C-123

## MIL-C-123

### HOW TO ORDER

Military Type Designation: Capacitors, Fixed, Ceramic Dielectric, (Temperature Stable and General Purpose), High Reliability

Part Number Example



### Part Number Codes

#### Voltage-Temperature Limits:

Symbol	Capacitance change with reference to 25°C over temperature range -55°C to +125°C	
	Without Voltage	With Rated DC Voltage
BP	0 ± 30 ppm/°C	0 ± 30 ppm/°C
BX	+15, -15 percent	+15, -25 percent

#### Rated Voltage:

Symbol	Rated Voltage Volts, DC
A	25
B	50
C	100
D	200
E	500

#### Capacitance Tolerance:

Symbol	Cap. Tolerance ±
C	0.25 pF
D	0.5 pF
F	1%
J	5%
K	10%

#### Termination:

Lead capacitors	
Symbol	Termination Style
C	Copper, solder coated (type C-4 or C-5 of MIL-STD-1276)
W	Copper clad steel, solder coated (type W-4 or W-5 of MIL-STD-1276)

## CROSS REFERENCE MIL-SPEC TEST REQUIREMENTS

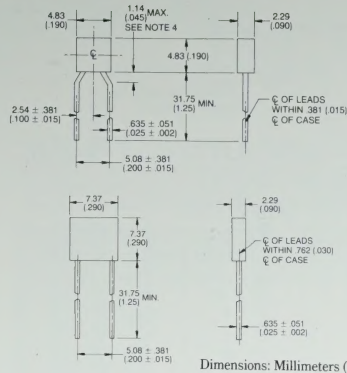
TEST DESCRIPTION	MIL-C-123	MIL-C-39014	MIL-C-20	MIL-C-55681
NDT (Non-Destructive Test)	100% Ultrasonic Scan or Neutron-Radiography	No	No	No
Pre-Cap Visual (Pre-Encapsulation Visual Examination)	100%	No	No	No
D.P.A. (Destructive Physical Analysis)	Lot by Lot—Pre-Termination Lot by Lot—Finished Product	No	No	No
Pre-Cap Terminal Strength (Pre-Encapsulation Pull Test)	Lot by Lot	No	No	No
Life Test (Lot by Lot)	Lot by Lot—1000 Hours	No	No	No
Low Voltage Humidity	Lot by Lot	No	No	No
Thermal Shock 100 Cycles	Lot by Lot	No	No	No



# MIL-C-123/Radial Leads

**MIL-C-123/STYLE CKS05, -/01**

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A01BPC4R7.C	4.7	C, D	BP	100
M123A01BPC5R1.C	5.1			
M123A01BPC5R6.C	5.6			
M123A01BPC6R2.C	6.2			
M123A01BPC6R8.C	6.8	C, J, K		
M123A01BPC7R5.C	7.5			
M123A01BPC8R2.C	8.2			
M123A01BPC9R1.C	9.1			
M123A01BPC100.C	10			
M123A01BPC110.C	11			
M123A01BPC120.C	12			
M123A01BPC130.C	13			
M123A01BPC150.C	15			
M123A01BPC160.C	16			
M123A01BPC180.C	18			
M123A01BPC200.C	20			
M123A01BPC220.C	22	F, J, K		
M123A01BPC240.C	24			
M123A01BPC270.C	27			
M123A01BPC300.C	30			
M123A01BPC330.C	33			
M123A01BPC360.C	36			
M123A01BPC390.C	39			
M123A01BPC430.C	43			
M123A01BPC470.C	47			
M123A01BPC510.C	51			
M123A01BPC560.C	56			
M123A01BPC630.C	63			
M123A01BPC680.C	68			
M123A01BPC750.C	75			
M123A01BPC820.C	82			
M123A01BPC910.C	91			
M123A01BPC101.C	100			
M123A01BPC111.C	110			
M123A01BPC121.C	120			
M123A01BPC131.C	130			
M123A01BPC151.C	150			
M123A01BPC161.C	160			
M123A01BPC181.C	180			
M123A01BPC201.C	200			
M123A01BPC221.C	220	F, J, K	BP	100
M123A01BPC241.C	240			
M123A01BPR271.C	270	F, J, K	BP	50
M123A01BPR301.C	300			
M123A01BPR331.C	330			
M123A01BPR361.C	360			
M123A01BPR391.C	390			
M123A01BPR431.C				
M123A01BPR471.C	470			
M123A01BPR511.C	510			
M123A01BPR561.C	560			
M123A01BPR621.C	620			
M123A01BPR681.C	680			
M123A01BPR751.C	750			
M123A01BPR821.C	820			
M123A01BPR911.C	910			
M123A01BPR102.C	1,000			
M123A01BPR112.C	1,100			
M123A01BPR122.C	1,200			
M123A01BPR132.C	1,300			
M123A01BPR152.C	1,500			
M123A01BPR162.C	1,600			
M123A01BPR182.C	1,800			
M123A01BPR202.C	2,000			
M123A01BPR222.C	2,200			
M123A01BPR242.C	2,400			
M123A01BPR272.C	2,700	F, J, K	BP	50
M123A01BXC271KC	270	K	BX	100
M123A01BXC331KC	330			
M123A01BXC391KC	390			
M123A01BXC471KC	470			
M123A01BXC561KC	560			
M123A01BXC681KC	680			
M123A01BXC821KC	820			
M123A01BXC102KC	1,000			
M123A01BXC122KC	1,200			
M123A01BXC152KC	1,500			
M123A01BXC182KC	1,800			
M123A01BXC222KC	2,200			
M123A01BXC272KC	2,700			
M123A01BXC332KC	3,300			
M123A01BXC392KC	3,900			
M123A01BXC472KC	4,700			
M123A01BXC562KC	5,600	K	BX	50
M123A01BXC682KC	6,800			
M123A01BXC822KC	8,200			
M123A01BXC103KC	10,000	K	BX	50



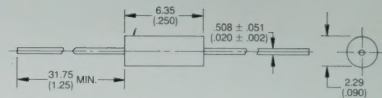
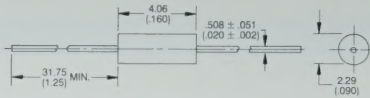
Dimensions: Millimeters (Inches)

**MIL-C-123/STYLE CKS06, -/02**

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A02BPC271.C	270	F, J, K	BP	100
M123A02BPC301.C	300			
M123A02BPC331.C	330			
M123A02BPC361.C	360			
M123A02BPC391.C	390			
M123A02BPC431.C	430			
M123A02BPC471.C	470			
M123A02BPC511.C	510			
M123A02BPC561.C	560			
M123A02BPC621.C	620			
M123A02BPC681.C	680	F, J, K	BP	100
M123A02BPC751.C	750			
M123A02BPC821.C	820			
M123A02BPC911.C	910			
M123A02BPC102.C	1,000			
M123A02BPC112.C	1,100			
M123A02BPC122.C	1,200			
M123A02BPC132.C	1,300			
M123A02BPC152.C	1,500			
M123A02BPC162.C	1,600			
M123A02BPC182.C	1,800	F, J, K	BP	100
M123A02BPC202.C	2,000			
M123A02BPC222.C	2,200			
M123A02BPC242.C	2,400			
M123A02BPC272.C	2,700			
M123A02BPC302.C	3,000			
M123A02BPC322.C	3,300			
M123A02BPC362.C	3,600			
M123A02BPC392.C	3,900			
M123A02BPC432.C	4,300			
M123A02BPC472.C	4,700	K	BX	100
M123A02BXC562KC	5,600			
M123A02BXC682KC	6,800			
M123A02BXC822KC	8,200			
M123A02BXC103KC	10,000			
M123A02BXC123KC	12,000			
M123A02BXC153KC	15,000			
M123A02BXC183KC	18,000			
M123A02BXC223KC	22,000			
M123A02BXC273KC	27,000			
M123A02BXC333KC	33,000	K	BX	100
M123A02BXC393KC	39,000			
M123A02BXC473KC	47,000			
M123A02BXB563KC	56,000			
M123A02BXB683KC	68,000			
M123A02BXB823KC	82,000			
M123A02BXB104KC	100,000			
M123A02BXB124KC	120,000			
M123A02BXB154KC	150,000			
M123A02BXB184KC	180,000			
M123A02BXB224KC	220,000	K	RX	50
M123A02BXB274KC	270,000			
M123A02BXB334KC	330,000			
M123A02BXB394KC	390,000			
M123A02BXB474KC	470,000			

# MIL-C-123/Axial Leads

Dimensions: Millimeters (Inches)

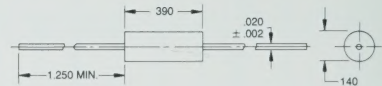


## MIL-C-123/STYLE CKS11, -/04

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A04BPC47.W	4.7	C, D	BP	100
M123A04BPC51.W	5.1			
M123A04BPC62.W	6.2	C, J, K	BP	100
M123A04BPC68.W	6.8			
M123A04BPC75.W	7.5			
M123A04BPC82.W	8.2			
M123A04BPC91.W	9.1	C, J, K	BP	100
M123A04BPC100.W	10			
M123A04BPC110.W	11			
M123A04BPC120.W	12			
M123A04BPC130.W	13			
M123A04BPC150.W	15			
M123A04BPC160.W	16			
M123A04BPC180.W	18			
M123A04BPC200.W	20			
M123A04BPC220.W	22			
M123A04BPC240.W	24			
M123A04BPC270.W	27			
M123A04BPC300.W	30			
M123A04BPC330.W	33	C, J, K	BP	100
M123A04BPC360.W	36			
M123A04BPC390.W	39			
M123A04BPC430.W	43			
M123A04BPC470.W	47			
M123A04BPC510.W	51			
M123A04BPC560.W	56			
M123A04BPC620.W	62			
M123A04BPC680.W	68			
M123A04BPC750.W	75			
M123A04BPC820.W	82			
M123A04BPC910.W	91			
M123A04BPC101.W	100	F, J, K	BP	50
M123A04BPC111.W	110			
M123A04BPC121.W	120			
M123A04BPC131.W	130			
M123A04BPC151.W	150			
M123A04BPC161.W	160			
M123A04BPC181.W	180			
M123A04BPC201.W	200			
M123A04BPC221.W	220			
M123A04BPC241.W	240			
M123A04BPC271.W	270			
M123A04BPC301.W	300			
M123A04BPC331.W	330	F, J, K	BP	50
M123A04BPC361.W	360			
M123A04BPC391.W	390			
M123A04BPC431.W	430			
M123A04BPC471.W	470			
M123A04BPC511.W	510			
M123A04BPC561.W	560			
M123A04BXC101KW	100	K	BX	100
M123A04BXC121KW	120			
M123A04BXC151KW	150			
M123A04BXC181KW	180			
M123A04BXC221KW	220			
M123A04BXC271KW	270			
M123A04BXC331KW	330			
M123A04BXC391KW	390			
M123A04BXC471KW	470			
M123A04BXC561KW	560			
M123A04BXC681KW	680			
M123A04BXC821KW	820	K	BX	100
M123A04BXC102KW	1,000			
M123A04BXC122KW	1,200			
M123A04BXC152KW	1,500			
M123A04BXC182KW	1,800			
M123A04BXC222KW	2,200			
M123A04BXC272KW	2,700			
M123A04BXC332KW	3,300			
M123A04BXC392KW	3,900			
M123A04BXC472KW	4,700			

## MIL-C-123/STYLE CKS12, -/05

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A05BPC111.W	110	F, J, K	BP	100
M123A05BPC121.W	120			
M123A05BPC131.W	130	F, J, K	BP	100
M123A05BPC151.W	150			
M123A05BPC161.W	160			
M123A05BPC181.W	180			
M123A05BPC201.W	200	F, J, K	BP	100
M123A05BPC221.W	220			
M123A05BPC241.W	240			
M123A05BPC271.W	270			
M123A05BPC301.W	300			
M123A05BPC331.W	330			
M123A05BPC361.W	360			
M123A05BPC391.W	390			
M123A05BPC431.W	430			
M123A05BPC471.W	470			
M123A05BXC122KW	1,200	K	BX	100
M123A05BXC152KW	1,500			
M123A05BXC182KW	1,800			
M123A05BXC222KW	2,200			
M123A05BXC272KW	2,700			
M123A05BXC332KW	3,300			
M123A05BXC392KW	3,900			
M123A05BXC472KW	4,700			
M123A05BXC562KW	5,600	K	BX	50
M123A05BXC682KW	6,800			
M123A05BXC822KW	8,200			
M123A05BXC103KW	10,000			



## MIL-C-123/STYLE CKS14, -/06

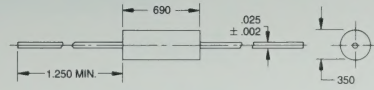
Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A06BPC241.W	240	F, J, K	BP	100
M123A06BPC271.W	270			
M123A06BPC301.W	300	F, J, K	BP	100
M123A06BPC331.W	330			
M123A06BPC361.W	360			
M123A06BPC391.W	390			
M123A06BPC431.W	430	F, J, K	BP	100
M123A06BPC471.W	470			
M123A06BPC511.W	510			
M123A06BPC561.W	560			
M123A06BPC621.W	620			
M123A06BPC681.W	680			
M123A06BPC751.W	750			
M123A06BPC821.W	820			
M123A06BPC911.W	910			
M123A06BPC102.W	1,000			
M123A06BPC112.W	1,100	F, J, K	BP	50
M123A06BPC122.W	1,200			
M123A06BPC132.W	1,300			
M123A06BPC152.W	1,500			
M123A06BPC162.W	1,600			
M123A06BPC182.W	1,800			
M123A06BPC202.W	2,000			
M123A06BPC222.W	2,200			
M123A06BPC242.W	2,400			



# MIL-C-123

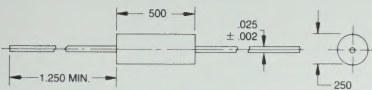
## MIL-C-123/STYLE CKS14, -/06 (continued)

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A06BP272_W M123A06BP302_W M123A06BP332_W M123A06BP362_W M123A06BP392_W M123A06BP432_W M123A06BP472_W M123A06BP512_W M123A06BP562_W M123A06BP622_W M123A06BP682_W	2,700 3,000 3,300 3,600 3,900 4,300 4,700 5,100 5,600 6,200 6,800	F, S, K ↓ F, J, K	BP ↓ BP	50 ↓ 50
M123A06BXC562KW M123A06BXC682KW M123A06BXC822KW M123A06BXC103KW	5,600 6,800 8,200 10,000	K ↓ K	BX ↓ BX	100 ↓ 100
M123A06BXC123KW M123A06BXC153KW M123A06BXC183KW M123A06BXC223KW M123A06BXC273KW M123A06BXC333KW M123A06BXC383KW M123A06BXC473KW	12,000 15,000 18,000 22,000 27,000 33,000 39,000 47,000	K ↓ K	BX ↓ BX	50 ↓ 50



## MIL-C-123/STYLE CKS16, -/08

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A08BPC242_W M123A08BPC272_W M123A08BPC302_W M123A08BPC332_W M123A08BPC362_W M123A08BPC392_W M123A08BPC432_W M123A08BPC472_W M123A08BPC512_W M123A08BPC562_W M123A08BPC622_W M123A08BPC682_W M123A08BPC822_W M123A08BPC912_W M123A08BPC103_W	2,400 2,700 3,000 3,300 3,600 3,900 4,300 4,700 5,100 5,600 6,200 6,800 8,200 9,100 10,000	F, J, K ↓ F, J, K	BP ↓ BP	100 ↓ 100
M123A08BPB113_W M123A08BPB123_W M123A08BPB133_W M123A08BPB153_W M123A08BPB163_W M123A08BPB183_W M123A08BPB203_W M123A08BPB223_W	11,000 12,000 13,000 15,000 16,000 18,000 20,000 22,000	F, J, K ↓ F, J, K	BP ↓ BP	50 ↓ 50
M123A08BXC124KW M123A08BXC154KW M123A08BXC184KW M123A08BXC224KW M123A08BXC274KW M123A08BXC334KW M123A08BXC394KW M123A08BXC474KW	120,000 150,000 180,000 220,000 270,000 330,000 390,000 470,000	K ↓ K	BX ↓ BX	100 ↓ 100
M123A08BXC564KW M123A08BXC684KW M123A08BXC824KW M123A08BXC105KW	560,000 680,000 820,000 1,000,000	K ↓ K	BX ↓ BX	50 ↓ 50



## MIL-C-123/STYLE CKS15, -/07

Part Number 1/	Capacitance pF	Capacitance Tolerance	Voltage- Temperature Limits	Rated Voltage
M123A07BPC112_W M123A07BPC122_W M123A07BPC132_W M123A07BPC152_W M123A07BPC162_W M123A07BPC182_W M123A07BPC202_W M123A07BPC222_W	1,100 1,200 1,300 1,500 1,600 1,800 2,000 2,200	F, J, K ↓ F, J, K	BP ↓ BP	100 ↓ 100
M123A07BPB242_W M123A07BPB272_W M123A07BPB302_W M123A07BPB332_W M123A07BPB362_W M123A07BPB392_W M123A07BPB432_W M123A07BPB472_W M123A07BPB512_W M123A07BPB562_W M123A07BPB622_W M123A07BPB682_W M123A07BPB752_W M123A07BPB822_W M123A07BPB912_W M123A07BPB103_W M123A07BPB113_W M123A07BPB123_W M123A07BPB133_W M123A07BPB153_W M123A07BPB163_W M123A07BPB183_W M123A07BPB203_W M123A07BPB223_W	2,400 2,700 3,000 3,300 3,600 3,900 4,300 4,700 5,100 5,600 6,200 6,800 7,500 8,200 9,100 10,000 11,000 12,000 13,000 15,000 16,000 18,000 20,000 22,000	F, J, K ↓ F, J, K	BP ↓ BP	50 ↓ 50
M123A07BXC123KW M123A07BXC153KW M123A07BXC183KW M123A07BXC223KW M123A07BXC273KW M123A07BXC333KW M123A07BXC383KW M123A07BXC473KW M123A07BXC563KW M123A07BXC683KW M123A07BXC823KW M123A07BXC104KW	12,000 15,000 18,000 22,000 27,000 33,000 39,000 47,000 56,000 68,000 82,000 100,000	K ↓ K	BX ↓ BX	100 ↓ 100
M123A07BXC124KW M123A07BXC154KW M123A07BXC184KW	120,000 150,000 180,000	K ↓ K	BX ↓ BX	50 ↓ 50



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